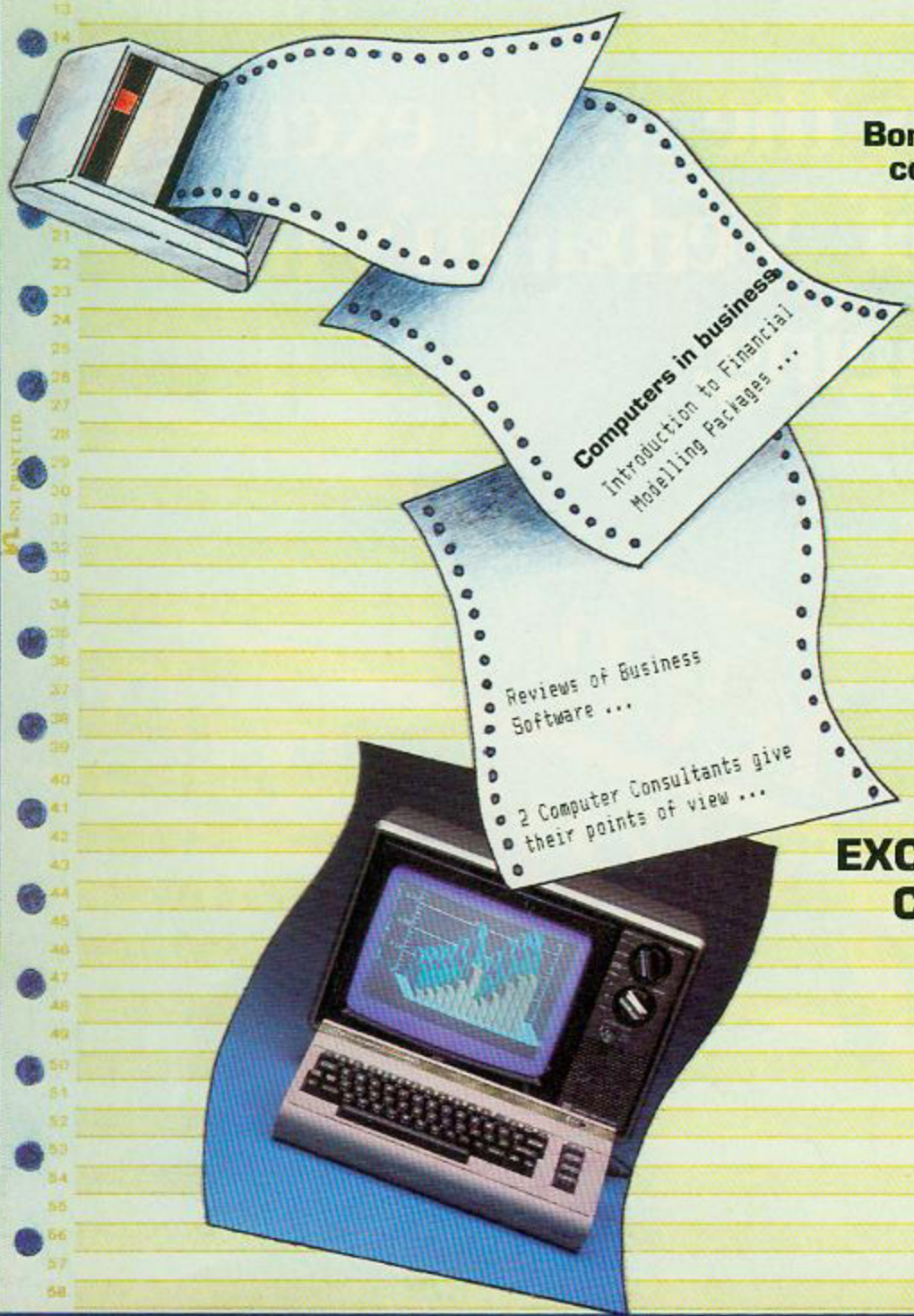
PERSONAL COMPUTER MAGAZINE

BITS & BYTES

Issue No. 8, May 1983: $1.00



Alternative machine Code programming

Computer camps

Bonus specials in our computer book club

Columns on
Education
Farming
VIC
Sord
System 80/TRS80
Apple
Sinclair
Hand-held

EXCLUSIVE! New Commodore 64 reviewed

Verbatim Datalife® flexible disks now come in a bold, new storage box. But more important, they now come to you with a five year warranty*.

We can give you a warranty this long because we're confident the way we make Datalife disks will make them perform better, last even longer.

All of our Datalife disks feature seven data-shielding advances for greater disk durability, longer data life. To protect your data from head-to-disk abrasion. To shield your data against loss due to environmental conditions. To ensure a longer lifetime of trouble-free data recording, storage and retrieval.

Every Datalife disk is extensively tested under the most extreme conditions. Critically-certified to be 100% error-free. Assuring you an added margin of performance, no matter what the operating conditions.

And we back it up with a five years warranty. Five times longer than the industry standard. Because Verbatim is the standard of excellence.

Verbatim®

Here's the most exciting part of Verbatim's new packaging.

5 Year Warranty

For flexible disks you can depend on — a lot longer. call (09) 444-6085

COMPUDATA MEDIA SYSTEMS LTD

Box 3273, 48 Ellice Road, Glenfield, Auckland

* See Verbatim's warranty policy for details.

inside BITS & BYTES..

Issue No. 8, May 1983

VIC 20 COMPETITION

Due to the large number of entries it has been impossible to do justice to the judging and select a winner in time for inclusion in this month's issue as planned.

So we ask the hundreds of entrants to be patient for another month while the judges decide the winner who will now be announced in our June issue.

PAID CIRCULATION NOW 5000+
MINIMUM PAGE NUMBER NOW 48

Coming up in BITS & BYTES

Micros on the farm — in June our second farm feature will focus on agricultural software now available in New Zealand.

Hardware Reviews

Olivetti M20

Brother Electronic Typewriter JR 100 — unfortunately no machine available to review for this issue.

Business

Review of IAL "Charter" suite of business programs. We decided to wait for the MSDOS version to review.

Peter Brown looks at the best known of the financial modelling packages, Visicalc.

Guide to the galaxy of computer jargon — a new beginners feature next month will try to explain the relationships between some of those terms in our glossary.

MICRO NEWS

IBM has released another version of its personal computer in New Zealand — just three months after the original model became available.

The IBM XT (XT stands for extension) features a built-in 10 megabyte hard disk, an option not available on the first model, an extra 64K of initial RAM (128K compared to 64K on the model 1) and a built-in asynchronous communications adaptor to allow the XT to communicate to other IBM PCs and larger IBM systems (this was only an option on the model 1).

With one 5¼ inch diskette, this base XT unit costs $14,539.

The XT has a total storage capacity of nearly 22 million characters of information, or the equivalent of 11,000 double-spaced typewritten pages.

A user with a PC model 1 will be able to upgrade it to the XT by adding an "expansion box", the hard disk and suitable circuit boards.

But IBM doesn't expect the XT to replace the model 1, indeed it thinks they will appeal to different markets — the XT for small business applications, the model 1 to the executive user with small and chiefly stand-alone applications.

* * * *

IBM has also introduced a new version of its disk operating system. DOS 2.0 supports expanded diskette and expansion unit storage capabilities for both XT and the IBM Personal Computer, and includes an extended version of BASIC, the popular programming language. It also allows selected IBM applications programs to operate on both IBM personal computers, as long as the necessary memory, diskette storage and other system resources are available. This compatibility means, for example, that programs and information may be exchanged between the two systems.

In addition, IBM has introduced PeachText, a word processing package by Peachtree Software. The advanced, easy-to-use package provides a series of "Help" menus for quick problem solving.

* * * *

The price of the Atari 400 was reduced by $300 to $999 in mid-April by New Zealand agents David Reid Electronics.

Previously retailing at $1295 the Atari 400 was obviously over-priced here in comparison to US ($2-300) and Australian ($5-600) prices and it could be the arrival of the Commodore 64 finally spurred a price reduction.

The price of the Atari 800 and all software and peripherals remains unchanged.

BITS & BYTES is published monthly, except January, by Neill Birss, Dion Crooks and Paul Crooks. Editorial and subscriber inquiries to Post Office Box 827, Christchurch.

ADVERTISING:

Auckland — Wendy Whitehead. Phone 794-807
Wellington — Annie Carrad: Phone 723-431
South Island — Graham Beecroft: Phone 554-265 Chch or telephone Christchurch 66-566

EDITORIAL:
Auckland — Cathy and Selwyn Arrow: 30A Bracken Ave, Takapuna
Christchurch — P.O. Box 827 or Phone 66-566
Wellington — Shayne Doyle, 280-333 ext 892 (W), 278-545 (H)

Production: Roger Browning, Graeme Patterson, Lee Teck Fui, Janine Morrell
Typesetting: Focal Point
Cover and Graphics: Sally Williams

Technical Editor: Chris O'Donoghue

Subscription rate: $8 a year (11 issues) adults
$6 a year for school pupils

Subscriptions begin from the next issue of BITS & BYTES after the subscription is received.

Back copies are available (except issue 1) at $1 per copy plus 50c per copy postage and packaging.

Subscription addresses:
When sending in subscriptions please include postal zones for the cities. If your label is incorrectly addressed please send it to us with the correction marked.

Distribution inquiries: Bookshops — Gordon and Gotch, Ltd. Computer stores — direct to the publishers.

Printed in Christchurch by D.N. Adams, Ltd.

MICRO NEWS

Polycorp just refuses to lie down and die. Two recent announcements indicate that the now Progeni Subsidiary is still very much alive and kicking in spite of some predictions.

First off was the news that 13 Poly units have been ordered by China, 11 for classroom units, plus two for administration tasks.

Progeni say the Poly is the first educational microprocessor selected for use in China. Given China's huge population the future potential market must be enormous.

Now Polycorp have released a small business microcomputer called the Proteus which has dual processors (Z80A and 6809) allowing it to run three operating systems CP/M, Flex and Poly.

The first two give it access to a large range of existing business software and the third, together with a built-in interface that allows the Proteus to be connected to the Poly,gives the Proteus a training facility for industry say Polycorp.

The dual disk version with two eight inch floppy disk drives, 64K memory and a separate VDU terminal costs $7657 while the single disk version costs $6435.

The microcomputer was designed, developed and is produced in Lower Hutt for distribution and sale from Progeni branches throughout Australasia. It arose from a deliberate policy of market diversification adopted when the software and systems house took a majority shareholding in Polycorp during October 1982.

Polycorp believes that Proteus will appeal to small, independent business operations

The new PROTEUS micro, a wholly New Zealand produced small business computer. It comprises standard 12" VDU terminal (left), rugged central processor and twin drive unit (lower right) and optional printer (upper right).

MICRO NEWS

David Reid Electronics will soon be releasing two more micros here — the eagerly awaited Spectrum, the colour computer from Clive Sinclair of ZX81 fame which rumours suggest will cost around $600 here.

The other is the largely Apple compatible MPF-II which Reid's say will cost under $1000 here.

A 64K 6502-based machine with full six-colour low and high resolution graphics and 16K of ROM BASIC, it is compatible with most Apple II software.

The full "calculator-style" QWERTY keyboard has four cursor control keys and larger keys for return, control, shift and space. As well as the conventional method input, the operator has the choice of single-key input of basic commands.

Templates display key works and another template gives access to the 49 graphics functions

The machine has three modes of operation — text, low resolution and high resolution. Text is restricted to black and white but both resolution modes support six colour graphics.

BASIC, Pascal and Forth languages are available for the MPF-11, and a built-in monitor program can be called from BASIC.

★ ★ ★ ★

The Olivetti M20 microcomputer has been released in New Zealand by Armstrong and Springhall.

Based on the 16-bit Z8001 microprocessor, the Olivetti has 128K bytes of memory and two 5¼ inch diskettes each with up to 320K bytes of storage capacity.

The M20 runs an operating system called PCOS (Personal Computer Operating System).

Graphics features of the M20 include the ability to split the screen into up to 16 windows for the simultaneous display of text, images, graphs and program and system messages.

The basic unit, including a 100 character per second dot matrix printer, costs $9300.

A review of the M20 will appear in our June issue.

★ ★ ★ ★

Interactive Applications Ltd and Interactive Applications (Australia) Pty Ltd have been sold to the New Zealand South British Group.

IAL, which specialises in microcomputer software hopes the additional capital backing will allow quick expansion of its product and market coverage.

★ ★ ★ ★

Continued on page 16

DICK SMITH

NEW ZEALAND

SAVE $300

NEW ZEALAND'S
MOST POPULAR
PERSONAL COMPUTER

THE DICK SMITH
SYSTEM 80

It hasn't become Australasia's fastest selling home computer by accident! The System 80 is a complete, ready-to-go computer. You don't have to buy add-ons like cassette recorders or monitors: the System 80 comes with a built-in recorder and modulator, so you can use it with any TV!
Don't be fooled by inferior computers which don't offer you the incredible features of the System 80 (like software compatibility with the world's largest range!) The System 80 is not just affordable: it's usable as well !!!

Compare these features and price with any other computer.

- Flashing Cursor.
- Built-in speaker and amplifier for programs with sound effects.
- Full upper & lower case video display capability.
- Monitor program (suitable for the hobbyist to program in machine language)
- Screen print facility (obtain a printout of any 'page' appearing on the screen)
- Three month guarantee from date of purchase.
- Great expansion capability and flexibility
- No separate tape recorder to buy – it's in-built!
- Cassette level meter and provision for a second cassette.

Cat. X-4005

Was ~~$1295~~

now only

$995

OVER 10,000 SYSTEM 80's SOLD

Take advantage of this once-in-a-lifetime special offer . . . Bulk purchase has allowed us to slash the price on this popular computer!!!

"The best value around for a ready built computer . . ."
(Electronics Aust. Magazine)

BIG SAVINGS ALSO AVAILABLE ON THE 'BUSINESS' VERSION SYSTEM 80 WAS ~~$1245~~ NOW $995
Cat. X-4100

New Zealand's least expensive Business Computer! Use it for Word Processing Accounting, Filing, Invoicing, Stock Control, etc. It has a separate 15-key numeric keypad, plus 4 special function keys. Why pay thousands of dollars more when the Business Computer System 80 MKII does it all? Cat. X-4100

7 DAY TRIAL OFFER
If you're not completely happy, you can return the System 80 in original condition & packing for a full refund!

DSE/EA453/JW

DICK SMITH Electronics

98 Carlton Gore Rd.
Newmarket,
Auckland 1.
Ph: 504 409

MAIL ORDERS:
P&P $5.00

Mail Orders: Private Bag, NEWMARKET

Shop by phone.
Use your Bankcard,
Or Visa card.

DBASE II: a powerful tool

By NEIL HARKER

Over the last few years we have seen an onslaught of new programming tools for the business person using computers which run CP/M or its equivalent. DBASE II, by Ashton-Tate, is such a product which is becoming very popular in USA and New Zealand.

A relational Database management tool that gives unlimited flexibility, its main function is the production of data storage files allowing later additions, editing, retrieving, indexing, manipulation, and sorting of data in them.

For the first-time user or someone not interested in programming, DBASE II has a set of built-in command instructions which allow manipulation of data without the need for fancy programming.

On the other hand, for the experienced user, command files (programs) can be written using either the built-in, screen based editor or Wordstar etc.

This makes DBASE II a very powerful tool for producing software for business purposes.

Unlike other programs, DBASE II has an excellent error correction system and error messages. When an error occurs, it displays the suspect instruction and gives the user the option to dynamically correct it, abort the command program, or skip that instruction.

I have been using DBASE II for about six months now, and believe this type of program really spells the end of programming in BASIC for writing business software. For instance, a complete general ledger capable of storing 65,535 transactions can be written in about 300 lines of program (try doing that in BASIC!)

DBASE II is very easy for the first-time user because most of the commands follow common sense — instructions such as EDIT, COPY, APPEND, DELETE, SET PRINT ON, and WAIT mean what they state. All instructions which manipulate strings and carry out logical operations follow those of BASIC.

For instance, .NOT. comes in the use of instructions such as REPORT and INDEX; with REPORT, you set up the specifications for the report by answering a set of questions, then save it with a name (say ABC) so that next time you want to run that report on your database, you simply enter REPORT ABC.

If you then wanted to report only data of a specific type, for example all ledgers exceeding $100, you could then say REPORT ABC FOR AMOUNT » = 100. If you wanted to report the data in alphanumeric order, you could index your data using the INDEX instruction — to index your ledgers on the field NAME, you would say INDEX ON NAME TO FRED where Fred is the file where the index is now kept for future use.

The manual which comes with the program is comprehensive and in two sections. The first is a version written for users not experienced with programming; the second is a more technical manual written by the author of DBASE II.

The program is made up of a central command program (DBASE.COM) that "calls" 10 overlay blocks similar to Wordstar, depending on the instructions being carried out.

Because of its power, DBASE II does take a lot of disk space (about 100k) and I have found a minimum of 250k of disk space is needed to do anything useful with it.

Other requirements for anyone contemplating buying it are 8080 or Z80, 48k ram, CP/M operating system, and a cursor addressable CRT.

After writing two major specialised business packages on contract (medical and bakery), I only now feel I have got to grips with most of the commands. Unlike BASIC, DBASE II is so vast it takes many hundreds of hours to learn all the instructions.

However, first-time users will find it very easy to use with its straightforward instructions; any love for BASIC, Cobol or Fortran soon disappears.

Like all software packages of this size, it has "bugs" (what doesn't?). But they are exceptions and occur only in unusual circumstances (it is hoped they will be corrected in later versions of DBASE II).

Anyone contemplating writing a business (or scientific) package should consider buying DBASE II. At just under $1000, it is money well spent.

COMMODORE VIC 20 COMPUTER–FOR THE WHOLE FAMILY!

World renowned VIC 20 –
Commodore's brilliant home computer
is at your dealer's today! It's a family machine –
with something for everyone . . . play the best
video games available . . . or teach yourself
a language . . . write your own programmes . . .
even use it to budget for that new car!
(And that's just a tiny sample of what it can do!)

VIC 20 plugs straight into your television set and comes complete with

- colour and sound
- full size typewriter keyboard
- graphics capability
- easy to learn BASIC language
- easy to follow instruction manual
- full service and support

Take a look for yourself! The affordable
Commodore VIC 20 is at your dealer's today.

commodore COMPUTER

VIC02

Commodore Computer (NZ) Ltd
11 Huron St, P.O. Box 33-847, Takapuna,
Auckland. Telephone (09) 497-081.

The 'Calc—a—likes'

— an introduction to financial modelling packages

By PETER BROWN

Probably one of the major factors behind the increasing popularity of personal computers has been the development of reliable, easy to use, and powerful software. The "electronic spread-sheet" programs were among the first to give the average user access to the full potential of a microcomputer.

Almost every major supplier of personal computers now offers a range of these spread-sheets, and the user can choose according to needs, equipment, and bank balance. Whatever you get will save a lot of time, energy, and frustration in handling routine "number-crunching" tasks.

Electronic spread-sheets are the simplest way to use your computer for budgeting, forecasting, modelling, or even balancing your cheque book. They can be used by anyone who occasionally has to resort to pen, calculator, and reams of paper to solve their financial or mathematical problems.

The programs come packaged as a floppy disk, plus manual, and are usable by people with no intimate knowledge of computing. However, it pays to have a good knowledge of your intended application, or access to someone who does — they will not turn you instantly into an accountant or mathematician.

The most suitable applications are those where the calculations or the figures being manipulated, are inter-related in some predictable way. Spread-sheet programs are frequently used for financial

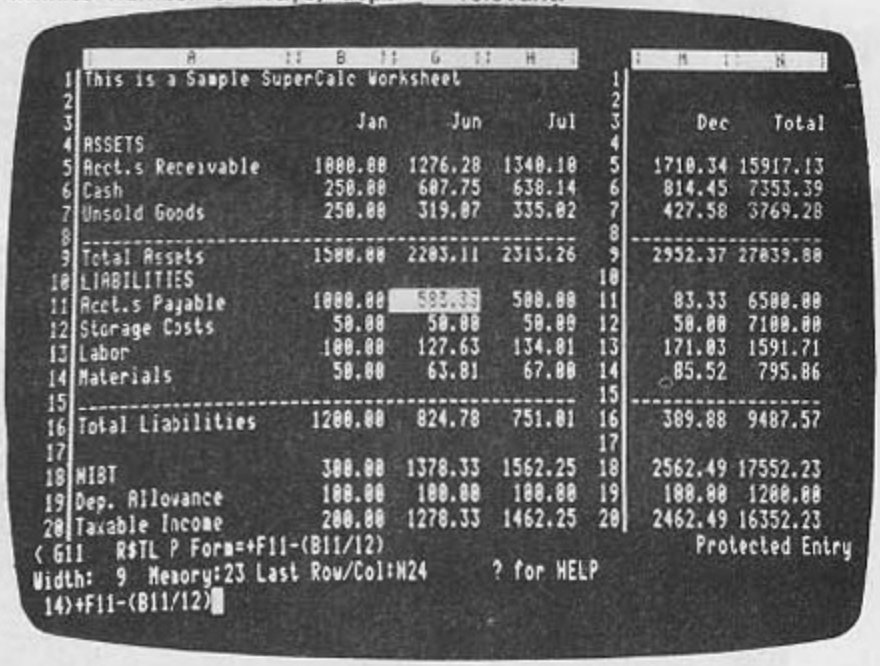
The VDU acts as a "window" into the sheet, displaying only a small portion of it at a time. By using commands through the keyboard, this window can be relocated over whatever part of the sheet you want to see. In most cases, it is also possible to vary the width of the columns so that the window "sees" more of the sheet at a time. And the screen can usually be split so that distant parts of the spread-sheet can be seen side-by-side.

You can format the sheet in an infinite number of ways, depending on your application. Probably the most common method is to give each row and column a fixed name or label. For instance, in a budget, columns would be named after months, rows might have labels such as sales, wages, office expenses, depreciation, etc.

However, it is usually possible (though messy) to put these labels anywhere you like on the sheet. This can be very useful if you have to format your work for printed output and use it in, say, reports.

The hard work starts when it comes to sorting out what calculations are needed and what relationships are to exist between the squares. Constants can be entered once and automatically copied along the rest of the row or column. If the value of a constant changes at any point, the change can be made at the appropriate place without affecting previous entries.

Formulas — Similarly, formulas (once they have been worked out) can be entered once, and then repeated from square to square with simple commands. Changes can be made as required. If, for example, salesmen's salaries are set at 20% of gross sales income, this need only be entered the first time it is used and the spread-sheet program can be instructed to copy that formula into each position where it is relevant.



In this way, you can arrange to "chain" or link the squares together so that the output from one formula becomes the input of another, and changes entered at any point are automatically carried through in following calculations.

Sub-totals, totals, averages, percentages, profits, and losses can be easily extracted in this way, often by using arithmetic functions built in to the software. Careful development of the formula used, and crafty chaining of formula can produce an entire year's budget just by entering the sales figure for January.

The Portable Business Computer

$3815.00
This includes double density!

OSBORNE 1™

Sirius Systems
2 Manukau Rd Epsom Auckland
Phone (09) 544-415, 504-789
Visit our showroom.

AUTHORISED NEW ZEALAND DISTRIBUTOR

CONTACT YOUR LOCAL DEALER NOW!

OSBORNE DEALERS

COMPUTER WORLD LTD: Cnr Lorne & Victoria Sts, Auckland. Ph 31-394. PO Box 967. Ms Gail Righini, Manager.
FINANCIAL SYSTEMS LTD: 161-163 Jervois Rd, Herne Bay, Auckland. Ph 789-068 or 789-069 (Specialists in financial modelling). PO Box 46-068, Herne Bay. Mr Mike Snowden, Manager.
MACHINEHEAD COMPUTER CO: 9 Marmion St, Auckland. Ph 771-566. PO Box 47-053. Mr Warren Wilson, Director.
TECHNOLOGY RESOURCES LTD: 8 Thackeray St, Hamilton. Ph 393-601. PO Box 4063. Mr Wally McKenzie, Director.
WAIKATO COMPUTER CENTRE LTD: 6 Princes St, Hamilton. Ph 393-416. PO Box 1094. Mr Bob Dean, Director.
LAKELAND TV & STEREO: 43 Horomatangi St, Taupo. Ph 88-888. PO Box 892. Mr Harry Leusink, Director.
TIMMS' BUSINESS EQUIPMENT LTD: Tennyson St, Napier. Ph 54-250. PO Box 308. Mr Neville Bannister, Sales Exec.
COMPUSALES SOFTWARE & HARDWARE LTD: 75 Ghuznee St, Wellington. Ph 844-146. PO Box 11-819. Mr Chris Gray, Director.
EINSTEIN SCIENTIFIC LTD: 177 Willis St, Wellington. Ph 851-055. PO Box 27-138. Mr Raju Badiani, Manager.
PEANUT COMPUTERS: 5 Duridee Place, Chartwell, Wellington. Ph 791-172. Mr M.S. & B.A. Stevenson, Directors.
ROSS & STAIG TV SERVICES LTD: 58 Collingwood St, Nelson. Ph 80-397. Mr Malcom Howard.
SMALL BUSINESS SOFTWARE LTD: 2nd Floor, IBIS House. Ph 64-617. 183 Hereford Street, Christchurch. PO Box 1013. Mr Bruce Foulds, Managing Director
ECLIPSE RADIO & COMPUTERS LTD: 134-136 Stuart St, Dunedin. Ph 778-102. PO Box 5270. Mr Bruce McMillan, Manager.
LEADING EDGE COMPUTERS LTD: South Cith Mall, Dunedin. Ph 55-268. PO Box 2260.Mr George Orr, Mrs Elaine Orr, Directors.

The Computer that is easy to understand . . . easy to use . . . simple to own . . .

IBM

The IBM Personal Computer.
A tool for modern times.

Backed by the expertise and on going support of

Geo Berryman Ltd

77 Ferry Rd,
Christchurch.
Ph. 793-920

CIS
Computer Information Services Ltd

modelling, cash-flow forecasts, budgeting, and other planning tasks in business or the home.

Squares — Once loaded into the machine, the spread-sheet gives you the electronic equivalent of an enormous sheet of squared paper — 63 columns wide by 254 rows deep, 16,002 squares in all. Each square can be individually addressed and may be assigned a label, or a value which can be either a constant or derived from a formula. These formulas can refer to other squares on the sheet.

Working out what your formula or equations are to be is the real stumbling block in this process; and there are no short-cuts.

Before starting work with the electronic spread-sheet, a considerable amount of thought must be given to deciding exactly what you want to achieve with the project you will be using it for. From this, you will be able to determine the logic behind each entry, and the links that naturally exist between the items on the sheet.

Even a very simple application will have quite complex relationships, and careful consideration before you move to the computer will go a long way towards ensuring your work with the spread-sheet program achieves something worthwhile and sensible.

Problems — At this stage, it is very important to have a good understanding of what your problem involves. If necessary, you should be prepared to seek expert help in setting up the spread-sheet. Thirty minutes with your accountant, for instance, will help ensure your cash-flow projections are realistic and not gibberish. (Even with the right background or help, you will also need a good grasp of simple algebra to put your ideas into the formulas the programs work with.)

Doesn't sound encouraging, does it? However, once you have set everything up satisfactorily, it's done and you can save it, on disk, for later use without having to go through the whole thinking process again.

When everything is set up and your first set of figures entered, you can use the spread-sheet to its full potential by playing "What if. . .?" — possibly the primary justification for going to all this trouble.

In the old days if you wanted to alter a figure on, say, a budget, you had to spend hours recalculating and rewriting the whole thing to find out the flow-on effects of your change. Not with this type of software however; now you can experiment easily and effortlessly.

Suppose you want to see what effect a change in sales tax, or wages, or in just about anything else has on your profits now, or in six or 12 months time. All you have to do is move, via the keyboard, to the appropriate place on the sheet, enter the necessary changes, then sit back and watch all the figures being recalculated, at computer speed, to accommodate your alterations. And you can do this time after time, exploring every possibility you can imagine.

Reworking — This facility for a complete reworking of all the figures, based on a change to just one item, allows a thorough examination of every likely solution to a problem, increasing the probability that you will be able to find a really satisfactory answer.

Once you have a solution, it's a simple matter to save it on disk, or have it printed out for inclusion in a report, loan application, or for permanent reference.

If your problem is important enough to warrant spending a significant amount of time looking into its logical basis and if it involves a large number of inter-related factors, then an electronic spread-sheet will help.

It doesn't really matter what type of machine you have, providing it's disk drive, since there are so many spread-sheets you're certain to find one that is suitable. I have even seen one, on cassette tape, for the ZX-81

Next month Peter Brown will look specifically at the most popular financial modelling package, Visicalc. Later he will study some of its growing number of rivals.

Implementing a computer system

This is the final instalment of John Vargo's series in selecting a small business computer. The series began in our November issue and back copies of all issues are available. John also intends compiling his series into book form and this will be available through BITS & BYTES.

The key to successfully converting to a computerised system is to allow a reasonable timespan for the process. Insufficient attention to detail now could be very costly later.

One of your most valuable assets will be your own employees and co-workers. Their enthusiastic support and participation in this phase of the project is more important than ever. Converting the easiest application first is highly recommended, and only convert one application at a time. Choose the department with the least pressure on it, and whose current procedures and formats most closely resemble the new system.

This approach will yield dividends in a number of areas. It will give you an initial success, with the least effort. It will allow you to overcome the inevitable teething pains of a new system without the added frustration of a department already under pressure, or extremely complicated. When you are ready to tackle the more difficult applications, you will not be distracted by the many little installation problems which occur in the initial stages. This will then allow you to concentrate your full efforts on the successful conversion of the other applications.

There are a number of specific implementation procedures you will want to follow:

Training — Training of employees must begin sufficiently in advance to be prepared for conversion of each application area. This means accounts receivable clerks must be trained so that they can help in the conversion of the A/R application.

Preparation — File preparation must be completed in advance, including culling of outdated files, bringing all files up-to-date and eliminating any backlog of work. Only after the files are orderly and current can we convert the manual records to be computerised ones.

Physical preparation of the site would include providing for electrical needs, security needs, communication and other needs of the new system.

Internal control procedures need to be designed to protect the integrity of the information system, and provide accurate, timely, and secure information to management.

Conversion — File conversion involves entering all manual records via the keyboard into the computerised files. This is a major job which must be done carefully if your final conversion is to provide reliable information. One suggestion is to convert the files over a period of time, only entering balances and new transactions, allowing the old transactions to finish flowing through the old system.

Testing — Once the files have been converted to a computer readable form, the application programs which will work on those files may be initiated.

Testing the new system by running it parallel with the manual system is generally a prudent idea. This should be done for long enough to assure yourself the system is reliable and performing as promised.

The story is told of a company which implemented an order entry and billing system without sufficient testing. It discontinued the manual system and started the computer system at the same time. At the end of the month it was discovered that order entry and billing programs could not exchange data. As a result, the company was unable to send the month's invoices to customers.

As the president of the company put it: "If we don't send our customers their bills, they don't pay them. If our customers don't pay their bills, we don't receive any money. If we don't receive any money, we can't pay for our new computer and its staff, not to mention the other incidental expenses involved in running this company."

Conclusion — As we have discovered, the process of selecting the right system to meet your needs can be complicated, and in many situations you would be wise to obtain professional advice from a information systems consultant.

Buy a system big enough to handle your needs for the next five years or so, expandable to accommodate future applications. Remember the data and procedures of your business are as much a part of the system as the hardware and software; and the trained personnel are the key to an efficient system. Do a good job of selection, your management information system for the next five years depends on it!!

Jeweller discovers valuable new gem

By CATHY ARROW

"Choose a machine which has the software available for your needs," was the advice which led Graeme Hall, a Manurewa jeweller to purchase a Sord computer and "Gemstock" program.

Gemstock, originally written for four Christchurch jewellers by Turners Ltd, of Christchurch, provides the details necessary to keep a close check on stock and sales on a daily, monthly and yearly basis.

With the 5in disk drive, it can handle 2000 stock items, divided into 40 departments and 1500 sales transactions a month. Four stock and four sales reports are available. Graeme can also know in five minutes, the wholesale and retail value of stock he is holding.

He considers being able to get labels printed automatically for serial number and retail price of each watch in his stock is just great and does two copies of each, one for the watch and one for the guarantee. Numerous facilities are built into the program and Graeme says clear instructions and details of options available are given in the excellent manual.

A larger version is available as the program was originally on an 8in disk drive and downloaded to a 5¼in disk for him.

When Graeme bought his system last September, Gemstock had only been available in Christchurch. Arrangements were made for an Auckland Sord dealer, Computer Management Systems, to set up his system. On delivery, he loaded all stock from his manual Kalamazoo system into the Gemstock program and his first full stock print out was ready for trade fair buying in October.

Graeme has discovered many simple, time saving activities — including sitting down after dinner to compile a program for a chart to take to a meeting half an hour later, even though he is only a one finger typist. Information on diamond prices, which came in varying formats from different sources, was quickly converted to an easy co-related comparison chart.

Winner — He chose his system on the basis of getting the machine which ran the software needed for his job. Now he feels he has come out a real winner because of PIPS.

As a businessman, familiar with business management procedures and interested in computers only as a user, PIPS (Personal Information Processing System) has proved an invaluable tool. So much so that Graeme has found he does not need to learn BASIC.

He believes PIPS, developed in the East, compares favourably with its western counterpart Visicalc, particularly as PIPS also includes an integrated database. He feels extremely confident with PIPS as it provides an electronic page for him to use.

With the 5¼in floppy disk divided into 76 pages, he just calls up the page to find information. The definite relationship between the command and the name of the function it describes has enabled him to memorise the most-used commands in a short time.

"Operation is easy," says Graeme. "It's quick to learn, and gives you what you want, when you want it, as you want it."

Graeme also uses PIPS for simple word processing and utilises the multi-search and automatic sort capabilities to full advantage for his local church roll.

He has a year's worth of statements on a 5¼in floppy and is now duplicating the format of his bank statement on screen, to be sorted and analysed. By starting from the same place as his accountant, he hopes to reduce accountant's fees. Combined with savings in stock, insurance, and old stock, Graeme expects a payoff period of three to five years for his system.

Nuts and bolts — The Sord M23 MIII with printer, Gemstock program, PIPS program, games disk, assorted stationery and colour monitor cost him about $10,000. His C-Itoh 1550 printer has been modified for Sord and is capable of handling the full graphics of the machine.

Graeme finds the colour monitor very useful, as highlighting figures in colour lessens mistakes and saves confusion between fixed data and data being entered. Bank statement debits are in red and he details column headings in a different colour to the main working area.

Quick conversion of any series of numbers into bar graphs means this application is well used.

A planned application is graphic pictures of Gem designs. However Graeme says his sons tend to take over the graphic facilities.

Asked about any limitations of his much loved PIPS, Graeme and the family can't write games programmes in PIPS. But this is easily overcome by loading in BASIC for the purpose.

He is now considering buying a new small Sord machine, when available, for the family, to leave his solely for business. He also expects to add CP/M (being adapted for the Sord) when it becomes available.

Graeme understands there are now 14 Sord computers in the jewellery industry, using the Gemstock program. But to him, PIPS has proved an unexpected and valuable gem.

SORD

the computer that makes programming OBSOLETE

1 SORD-PIPS makes ordinary programming obsolete.

For the average person, it is hard enough to learn what a computer language is, much less use one for work. Many people give up as soon as they find out how much new information has to be learned just to begin programming. Even BASIC, which is supposed to be the easiest language to learn, leaves most people wondering "Isn't there an easier way?" Now there is. SORD-PIPS, a no-programming language that takes the hard part out of using a computer. With SORD-PIPS you don't have to bother with programming at all — it is already taken care of for you. Just spend a few hours learning the simple PIPS commands and you're ready to use your new SORD computer the day it arrives.

2 SORD-PIPS has nearly 60 commands for your ordinary office tasks — and more.

Your everyday office work probably consists of creating tables, making files, retrieving information, sorting information, performing calculations, and drawing graphs. SORD-PIPS has nearly 60 commands that take care of these routine jobs automatically. All you do is select the right command and SORD-PIPS does the job for you — quickly and correctly. Even people with no technical background will be able to finish normally difficult and time consuming jobs in a matter of minutes with the help of SORD-PIPS.

3 SORD-PIPS interactive language that works with you.

SORD-PIPS is interactive, which simply means it asks you questions on the screen and you give it answers from the keyboard. SORD-PIPS selects the appropriate job routine automatically, and processes the information the way you want it. It takes only 30 minutes to learn how to "interact" with SORD-PIPS, and if you want even better command of the language, a three-day course is also available.

4 SORD-PIPS — the language developed from the user's point of view.

The more business experience you have, the easier it is to use SORD-PIPS, because SORD-PIPS was developed not from the computer manufacturer's point of view, but from that of the user. The jobs you want to do are already in the program. All you have to do is enter the information. SORD COMPUTER SYSTEMS INC. developed this language based on actual experience in routine office work — SORD-PIPS is not a programmer-oriented language that can be applied to any kind of office job. It is best appreciated by those who do the work rather than by those who figure out how to do it. For everyone from office workers to company presidents, SORD-PIPS can be used for everything from daily data processing and daily business administration to management simulation and advanced strategic planning.

FOR FURTHER INFORMATION, PHONE OR CALL TODAY AT

COMPUTER MANAGEMENT SYSTEMS

SORD COMPUTERS ENTRANCE ALBERT ST

102b Albert St (Cnr Victoria & Albert Sts). Ph. 793-688, 793-408

Two computer consultants give their point of view on business computing. A.G. Jeffery from Thames and Robert Vallie from Auckland.

Getting a start — from a user's viewpoint

By A. G. JEFFERY

A distinction should be made between those who predominantly hit the computer keyboard for output and those more interested in the workings of the machines. The former is the person I consider to be a user.

What confronts a small businessperson looking at computerising a small business?

Either, I think I need a computer for my business because it will keep my costs down, make me more competitive, the competition down the road has one.

Or, no way will a computer ever be useful to me because I don't understand them, don't have time to figure one out, it will increase my costs without increasing my revenue.

Such conclusions will be based on an understanding of needs. But how does a small businessperson "do their homework"?

- Read tonnes of literature on small business systems. What small business owner has the time and money to do that? And if they do, what do they read? American, British and Australian books and magazines which have limited practical value to them.
- Go to their accountant who simply looks at the costs of installing a computer system? Which and what doesn't really concern them.
- Ask a friend who is a microcomputer hobbyist. But what does a hobbyist know about the relative advantages of various systems for a small business?

He or she is probably hung up on the inner workings of a Pear or Garbage Can 80 and on the way to a Ph.D. in computer science. Even if they aren't "one-eyed" about their favourite machine, they'll be rare beasts indeed if they know more than just a little about small business systems.

- Go to a consultant. But which?

He looks good but he's also a salesman for Pickles Systems What about her? Consultant for a software house, only handles accounts over $X0,000. And him? He is Pickles Systems. While this one only handles outfits that will probably need a mini or mainframe - 20,000 invoices a month and up.

Give Up

Give up and stick to bits of paper and the accountant. But what about those small businesses that are "computerising"?

Let's look at this business here. Good looking machine. Excuse me sir, are you the owner? You are, how come you're operating the computer? I enjoy doing it, I write my own programs. You mean you're a hobbyist as well? Yes. Would you consider that your costs have declined. Hell no, and what's more I don't care, I'm selling the programs.

Interesting reasons for computerising a business: a tax-deductible hobby.

Let's try another. Excuse me, do you think you've saved money since your computerised? Most definitely. Your business has expanded then. A lot, these premises are twice the size of the old ones and our custom has trebled. Has the computer kept pace? Well, no. We're going to have to get a bigger machine soon. Any other problems? Yes, big ones; this machine won't allow us to transfer our data to the new one automatically. We're going to have to key the lot in from scratch. What about the programs? They're going to have to be completely rewritten.

Now this business seems to have everything worked out. The computer doing well is it? Definitely. No problems? Well, no problems, no. You hesitated. Well yes. You see, since we bought this machine we have found there is another available that would enable us to computerise some functions we didn't know could be. That would have increased productivity X%. What about price? The one we bought was actually more expensive than the more flexible one.

Not pretty

Not a pretty picture, the New Zealand scene from the point of view of one type of the small business user.

What can we do about it?

Any advice from any well-informed source, given with the end-user in mind, has to be better than nothing at all.

If the businessperson has the time, inclination and ability, going it alone could be an option.

For those who don't (and probably the majority fit here), some independent, objective assessment is a must. After all, as the businessman said when asked why he didn't do his own accounting: "That's what I pay the accountant for. I pay him for good advice. If he doesn't give it, I sack him."

Experience

Take my own experience as an example. I have a TRS-80 Model III but I was well aware that a screen and disks are only good for playing Space Invaders. I had to get a printer.

I look around and can't find anything of the quality I needed for less than $3500. After buying the TRS, I simply don't have the money.

I look around. I'm told a business in town is trying to hock off an Anderson & Jacobson Selectronic, certainly not your standard Tandy-type printer.

After a fair amount of fuss, we hook the two beasts up. And what have I got? - In my opinion, a perfectly serviceable system.

It has its shortcomings. The printer isn't anywhere as fast as a dot matrix or daisy wheel but no one has yet complained the type is unreadable.

The point of all this is that starting out and never arriving is still much better than never starting at all. Much of the resistance to

computers today seems to be based on the "if it's not perfect, we won't touch it" fallacy.

Let's face it, tradeoffs are necessary, and unavoidable. Optimisation of available resources seems more realistic than flying some idealistic kite.

Group scheme

The group scheme is another option for the small business - especially if it is one of several such businesses in an area. Unfortunately, such schemes are often geared to the top end of the micro market, or to minis.

But let's face it, maybe the lower-end machines are simply not for the small business. Maybe, when it's a case of "you pays for what you gets" and cheap can, all too often, end up nasty.

The machine may be fine, but what about backup; hardware maintenance and software? Is the outfit you bought the machine from willing to enter into a reasonable maintenance contract, say no more than 15% of the capital cost of the machine? Are you willing to pay more for tailor-made software, or pre-packaged, possibly foreign, software.

I believe pre-packaged software, including the electronic spreadsheet programs, are a pain in the fundament if you don't have the time to set up the models or the money to pay someone to do it for you.

For the home computer user who runs applications programs rather than "reinventing the wheel", the opportunities given by pre-packaged software to figure out how it all works would have to be considered as part of the fun of having a computer. All those zaps. But to the home user, time isn't money.

The case for a personal computer

By ROBERT VALLIE

Personal computers can provide business managers and professionals with solutions to the toughest business problems. You require your information to be filed accurately, organised and reports generated. You often need up-to-date and easily accessible information in making decisions and you look at "What if...? scenarios in solving problems.

In short, personal computers provide you with business solutions. These desktop computers are cost-effective productivity tools — integrated information management systems which are easy to use, powerful and flexible.

Ideally, personal computers will not only solve your business problems today but allow for future business changes and expansion. The common management tools or applications available on personal computers and used by management and professions are:

- Numerical Analysis — financial budgeting; forecasting, analysis and modelling; "what if...?" and statistical analysis. Referred to as electronic spreadsheets.
- Information management — simple mailing and client lists to complex management of your files (inventory, expense accounts and personal records). Referred to as electronic filing systems.
- Business graphics — using results from your numerical analysis and files, quality charts and graphs for presentation.
- Word processing — memos; personal and form letters; contracts; articles; reports.
- Project management — exchanging data between computers (micro, mini and mainframe computers) and data banks; turning your personal computer into a mainframe terminal.

The real benefit is being able to use all these applications to meet a single objective or solve one problem. This greatly increases your effectiveness and efficiency.

A manager can quickly prepare budgets or sales forecasts based on accurate information stored electronically, present the information graphically, organise and print reports and even send copies to distant locations.

If these individual management applications are easy to learn and use, integrated and expandable, you end up with a very sophisticated and powerful management tool that will save you time and money.

Choice — From the busy manager's viewpoint, it is often best to find an independent consultant to assist in selecting a personal computer. Quite frankly, the range of personal computers available (software and hardware) can make selection a mind-boggling and very risky exercise.

A consultant becomes your teacher, translator and adviser. Based on your selection criteria (features, quality, vendor reputation and price) and the consultant's background in data processing and management applications, you receive objectivity and data processing jargon translated to business concepts.

After defining your requirements and selecting your specific management applications, a computer is recommended and assistance provided during installation.

A consultant's fee, usually 5 to 10% of the total personal computer system price, can easily be justified as insurance against disaster.

Systems — Personal computer systems for managers will consist of a computer, disk storage and printer (referred to as hardware) and management applications (software). Small portable systems start from around $5000 (include word processing and spreadsheet analysis) and range to over $25,000 for fully integrated systems (all applications included) that you can learn and effectively utilise in a few hours.

The personal computer can become a cost-effective management tool, providing you obtain what you require, are able to easily learn and use the applications, and be able to expand the system in future.

Robert Vallie is an independent software consultant specialising in personal computers.

From page 4

Apple database to be established

CED Distributers has recently completed negotiations with an Australian company for the system software to operate an Apple computer database in New Zealand.

This database, due to come into use in June/July, will be very much education-oriented. It will be available to colleges and high schools for exchange and storage of programs.

Schools will be able to access the database from their own computers via an acoustic coupled modem. By dialling a telephone number and plugging their telephone handset into the coupler they will then be able to access any of the 2500 public domain Apple programs that will be available.

Acoustic couplers convert a computer's digital signals into tones suitable for sending over an ordinary telephone connection. Several models are available on the NZ market, from $150 do-it-yourself units to $800 imported models.

CED Distributers also plans to include an Apple Bulletin Board System (ABBS) later. This will allow schools (and perhaps individuals) to dial in information, notices and messages for later access by schools or individuals, as preselected by the originator.

Software tax update

It appears all the rush to have submissions on the Customs review of duty and sales tax on software in by February 15 (as reported in the February issue of BITS & BYTES) was unnecessary. After informing us the deadline was February 15 the Customs Department then extended it to March 31.

A report on the software tax question was then due to be presented to Customs Minister, Mr Keith Allen, at the end of April.

PAID CIRCULATION NOW 5000+
MINIMUM PAGE NUMBER NOW 48

The Commodore 64 — full features, budget price

When the reviewer decides to buy . . .

By Steven Darnold

Personal computers in New Zealand tend to fall into two price ranges. At $800 to $1400 are the budget computers with cheap keyboards, narrow screens, small memories, and limited expansion capabilities. At $2000 to $3000 are the high-quality, fully featured computers.

The price of the Commodore 64 is $1295. This would seem to put it in the budget-computer category. However, the Commodore 64 is actually a high-quality, fully featured computer. Careful analysis reveals that the Commodore 64 is more than a match for the Apple II, Atari 800, and BBC Model B.

First Impressions

When you take the Commodore 64 out of its box, it looks very much like a Commodore VIC-20. The case is the same size and the keys are laid out in exactly the same way. The main difference is the smaller cartridge slot and the darker colour of the case. There is also an extra joystick port and an audio-video port.

The quality of the Commodore 64 first shows when you start to assemble it. There is no nasty modulator box. The modulator is built-in and it produces a lovely colour picture straight away. The modulator cable is three metres long and there is 1.5 metres of cord between the wall plug and the transformer, and another 1.5 metres between the transformer and the computer. This generous allowance of cord means you can comfortably use the 64 while lying on the couch.

The Commodore 64 produces a very legible 40-column display on an ordinary television set. Sounds are played through the television's speaker, although a high fidelity speaker may also be connected to the audio-video port. The cassette port happily accepts a PET or VIC cassette drive; the serial port happily accepts a VIC disk drive.

The Commodore 64 User's Guide does a reasonable job of explaining how to set up the computer, use the keyboard and LOAD and SAVE programs. However, the section on programming is too brief to offer much assistance. Beginning programmers will need to buy "Gortek and the Microchips" or "Introduction to BASIC." Similarly, the technical information given in the User's Guide is pretty limited. Serious programmers will need to buy the "Programmer's Reference Guide" for 500 pages of solid information.

Graphics

The Commodore 64 has the most extensive graphics capabilities of any computer I have seen. First, it can use the standard PET graphics characters. Second, it can redefine all 256 characters in the character generator. Third, it can plot individual pixels on a 320 x 200 bit map. Fourth, it can display sprites. All these capabilities can be mixed freely. You can plot on the bit map, print characters, and push sprites around all on the same screen.

The sprites are spectacular. Even in BASIC, the special graphics chip can move eight four-colour sprites swiftly around the screen. Each sprite has a priority which determines whether it passes behind or in front of other screen objects. There is also a collision register which records a sprite's contact with any other screen object.

Sprites are easily altered. Several images can be stored for each sprite, and a single POKE will flip from one image to another. Thus, it's easy to make a bird flap its wings or a space invader wave its arms. And if you need a bigger sprite, a single POKE doubles a sprite's size horizontally or vertically.

Within an hour of unpacking the Commodore 64, I had a big white square revolving around the blue letters of a program listing. The square moved from left to right in front of the letters, and then from right to left behind the letters (but in front on the grey background). It looked so realistic that the blue

Commodore 64 review (continued)

letters appeared to stand out from the screen a few millimetres. I then put a hole in the white square, and (amazingly!) the blue letters were visible through the hole as it passed over the listing. The graphics of this machine are just incredible.

Sound

The sound on the Commodore 64 is the best I have heard from a computer. Be it gunshots or violins, a blindfolded listener would have difficulty distinguishing the computer's rendition from recordings of the real thing. The special sound chip in the 64 produces three separate voices, each with a range of nine octaves. The programmer has detailed control over the type of sound produced by each voice. This includes setting the timbre, attack, decay, sustain, release, high-pass filter, low-pass filter, bandpass filter, and vibrato. The sychronisation and ring modulation of voices is also possible.

I am no musician, but I have produced several sounds by trial and error. It is quite overwhelming. Clearly there is enough capability in the sound chip to keep an enthusiast busy for years.

Programming

When the Commodore 64 is turned on, there is 38K of RAM available for BASIC programs. This is reduced by 8K if the hi-res bit map is used or by 4K if the character generator is redefined. For machine language programs 50K of RAM is available via a simple POKE which turns off the BASIC ROM. Further RAM, up to 64K in total, is available to programmers prepared to write their own operating system and I/O routines.

Programmers will relish the Commodore 64's flexibility. Because there is RAM under all the ROM, it is quite possible to transfer BASIC or the operating system to the RAM below, where it can be modified. Similarly, screen memory can be moved to almost any location. This is very handy for emulating a different brand of computer which has its screen memory in a different location.

The Commodore 64 has an excellent full-screen editing system. No special EDIT or COPY mode is required. Any line on the screen can be modified simply by moving the cursor to the line and inserting or deleting as required. When the line is perfect, you press RETURN. What you see is what you get.

The Commodore 64 uses the same version of Microsoft BASIC as the PET and the VIC-20. This BASIC, unfortunately, has no special commands for utilising the 64's advanced graphics and sound features. Programmers will either have to POKE the sound and graphics registers directly or buy Commodore's extended BASIC cartridge. This cartridge adds 114 commands for graphics, sound,

Microcomputer Summary

Name:	Commodore 64.
Microprocessor:	6510 (=6502 with special features).
Clock Speed:	1 MHz.
RAM::	64K (38911 bytes free for basic).
ROM::	20K plus up to 16K as cartridge.
Input/Output:	Buffered cassette port (500 baud), buffered RS-232 interface (50-19200 baud), parallel user port, cartridge slot (for extra ROM or alternate microprocessor), audio-video ports (audio-in, audio out, modulated video out, composite video out), two joystick ports.
Keyboard:	Full-size 65-key typewriter style, auto repeat on all keys (selectable), four programmable function keys, 10-stroke buffer.
Display:	25 lines by 40 characters, upper/lower case, inverse video, 16 colours.
Languages:	Microsoft BASIC in ROM and 6502 machine language. Optional BASIC compiler, UCSD Pascal, Pilot and Logo. Other languages available via CP/M option.
Graphics:	Text mode — 64 standard graphics characters, up to 256 user-definable characters Hi-res mode — 64,000 pixels, 16 colours (but only two in each 64-pixel block). Multi-colour mode — 32,000 pixels, 16 colours (but only four in each 32-pixel block). Sprites — 16 colours (but only 4 per sprite), sizes from 1 pixel to 48x42 block, 8 priority levels for 3-D graphics, sprite-sprite and sprite-background collision register.
Sound:	3 voices, each totally addressable through 9 octaves, attack/decay/sustain/release, filtering, modulation and white noise.
Cost:	$1295
Options:	IEEE-488 port, CP/M cartridge, extended BASIC cartridge, 80-column cartridge, machine language cartridge, KEYNET networking system.
Peripherals:	Uses all VIC-20 or (via IEEE-488 options) PET/CBM peripherals. There are 7 models of disk drive, ranging from single 170K floppy ($1295) to 7.5M winchester ($7311). All disk drives are intelligent and use no computer RAM. There are 5 models of printer, ranging from 80-column dot-matrix ($895) to heavy-duty 132-column dot-matrix ($3560) and daisy-wheel ($2995).
Review unit from:	Commodore Computer (N.Z.) Ltd.
Ratings:	Documentation, 4; Ease of use, 3; Language, 3; Expansion, 5; Value for money, 5; Support, 4.

program debugging, structured programming, and mathematics. It will cost about $200 in New Zealand and should be of considerable interest to educational users.

Software

Normally it takes a year or two for much software to become available for a new computer. The Commodore 64, however, is not really a new computer. Its BASIC is the same as the PET, its tape and disk are the same as the PET, its screen dimensions are the same as the PET, and it can use PET graphics. As a result, many PET programs run perfectly on the 64. In fact, the only minor adjustments, the 64 will run 90 per cent of PET programs. This makes thousands of programs immediately available for the 64.

Several of the biggest producers of Apple and Atari games have announced that they are adapting their programs to run on the 64. This includes Sirius Software, Broderbund, and Infocom.

Several sophisticated machine language programs have already been written specifically for the Commodore 64. This includes four word processors, two spreadsheets, and a BASIC compiler. The most interesting thing about these programs is that they are selling for about half the price of their PET equivalents. Obviously, the 64 is aimed at a mass market, and the hardware and software are being priced accordingly.

Peripherals

Because the Commodore 64 uses PET and VIC-20 peripherals, there is a huge range to choose from. Joysticks, paddles, light pens, printers, floppy disks, hard disks, speech synthesisers, and plotters are all available.

Because Commodore computers use a more sophisticated tape system than most other microcomputers, you can't use an ordinary cassette recorder with the 64. The special Commodore cassette unit costs $149.

What's wrong with the Commodore 64?

It may appear from this review that the Commodore 64 is a perfect computer, without a single flaw. The fact is: I am hugely impressed by the 64, and I am going to buy one. However, not everyone will share my enthusiasm.

Some people will not like the BASIC. They may want an ELSE for the IF-THEN, or they may want more than 10-digit accuracy, or they may want special sound/graphics commands. No implementation of BASIC pleases everyone (in fact, some people hate BASIC itself). The advantage of the Commodore 64 is that a single POKE blows BASIC away. If you don't like the built-in BASIC, select an alternative and use it instead.

Some people will not like the way the Commodore 64 imbeds colours and cursor movements in PRINT statements. PET and VIC-20 users are already familiar with this feature and know how handy it is. It takes some getting used to, but it is a very powerful feature.

Some people will complain that the 500-baud tape recording rate is not fast enough. However, Commodore aims for high reliability, not high speed. That is why the 64 uses a special cassette recorder; that is why the 64 has a 191-character cassette buffer; that is why the 64 actually records every tape file twice (at 1000 baud) so that read errors can be corrected. Besides, if Commodore had changed the recording format of the 64, it would no longer be compatible with the PET and the VIC-20. There's little enough compatability in the microcomputer world — I congratulate Commodore for holding on to its tape standard.

Some people will complain that the 64 should display 80 columns, or that it should have a built-in assembler, or that it should run CP/M. No problem. Cartridges are available already to do these things. As any Apple owner will tell you, if you can't customise your computer to fit your needs, then it's not really a computer.

Final remarks

I have now had the Commodore 64 for ten days, and in that time there were many thrilling moments as I grappled with graphics and sound. However, the sweetest moment of all was when I loaded the 64 with a humble PET program written in 1978 — the dawn of the personal computer age. It ran perfectly. This is the strength of the Commodore 64: its advanced features point to the future, but its roots run down to the earliest days of microcomputing.

Taxing the computer

Sirs — Many thanks for a very informative article on duty and sales tax on software etc (February '83 issue). As I write this, I still await an answer to an enquiry from the custom house in Wellington. Perhaps, the computer they use can't or is still computing the variety of tariffs available to the department.

It is a pity I didn't receive this issue until the day of "media for data processing equipment" or they may have had this jumble of words.

Once again, thank you and keep up your informative reporting.

I.McDONALD (Taupo).

Computer: tool or topic?

Sirs — I am responding to an article in your February edition which proposes that computer studies should become a school certificate subject.

To my mind, this sort of plea represents the tip of an iceberg which I know worries many teachers and, even more, worries many employers as well as parents.

The worry is: do teachers recognise the computer as a tool or a subject?

In industry, we want people to understand how to use the computer for developing, or better servicing, business. We need people who are knowledgeable in using the equipment and have a basic understanding of what is going on.

But do we need people who can program, or re-program, the computer? That is a specialist exercise in an ever-changing world of advancing technology.

We don't have any school certificate courses on book production, manufacture of tape recorders, or production of films. These are all tools used in the pursuit of greater understanding or knowledge.

It is my belief, and I know that of many others, that the computer is another such tool, though a sophisticated one.

Around the world, one can see varying approaches to the use of computers in schools. America has computer-assisted instruction. Britain has computer-assisted learning.

Those are the two poles between which education should site itself. Do we use the computer as a form of instruction (and a subject in itself) or do we use it to assist learning and develop a greater understanding of both computer and subject?

The vast majority of people, I am sure, consider computer-assisted learning to be the ultimate. Whatever program comes into computer studies in schools should be strictly related to how to understand the machine and how it can help the student get a better grasp of individual subjects.

Does computer studies therefore have a place in school certificate? I doubt it.

— D.J. HEAP (managing director, Heineman Publishers (NZ) Ltd).

P.S. If anybody should think I have a pecuniary interest in pleading that computers are merely a tool and not a subject because I am a book publisher, my own company publishes one of the most extensive ranges of educational software available in schools anywhere in the world. We are thoroughly conversant with and thoroughly approve of computer-assisted learning.

Happy days

Sirs — Your recent packaging of your excellent magazine is the best thing to fall into my letter box since my 1981 tax refund. For once, it arrived clean and flat, and I'm grateful. Thanks. — D.R. GREENFIELD (Morrinsville).

Note to correspondent

Delaney McVay: your letter has been referred for comment.

The quest for computer knowledge

By MIKE WALL

The great scramble for knowledge started by itself.

Time magazine helped it along considerably when it announced its infamous "Machine of the year" and now the B.B.C. computer series is winding things up to fever pitch.

Nice, average, ordinary New Zealanders are discussing bubble sorts. Little do they realise that learning about computers can be horribly addictive.

Sure it seems innocent enough. You can play the odd computer game at a party and flick idly through the computer section in the newspapers. Then you find yourself standing in the middle of computer shops without any idea how you got there. You seriously contemplate "doing a deal" with a microcomputer salesman.

Hundreds and hundreds of people are finding themselves hooked on learning about computers. That's marvellous; a computer-literate population can only be in everybody's best interest. What causes me concern is the matter of education.

I more or less had to teach myself what I currently know about computers and most of my teacher colleagues are in the same position. In this day and age there must be a better way.

The local Polytechnic was absolutely swamped this year with enrolments in all computer classes. In fact, most rolls were closed well before morning tea on enrolling day and I suspect that other centres noticed a similar "panic" demand.

If my Polytech experience is anything to go by, a sizeable proportion of first-time students come equipped only with the vague idea that they want to know something . . . anything . . . about computers. And what do they get? BASIC and/or Pascal.

Those students who have enrolled to learn BASIC and/or Pascal are quite happy. The Polytech tutors are experienced professionals and they do their job efficiently. But it is my opinion that those students who are just along to learn about computers in general go home unfulfilled.

Enter the secondary schools! The argument over what pupils should be taught in a core computer "awareness" course has been and gone. BASIC and/or Pascal were left lying in the dust to be picked up again at a later stage. Most teachers I know shed no tears; there were good, sound educational arguments for keeping programming well away from learning about computers.

That doesn't mean to say, of course, that pupils don't learn ABOUT programs. The course guidelines issued by the Department recommend that they are at least shown a simple listing, but the point is that they are there to learn about computers and not about writing code.

Those secondary schools brave enough to offer night classes in "Computer Studies" or "Computer Awareness" were just as swamped as the Polytech. This time however, rather than getting a mixture of students who are starting with empty but open minds and those who specifically want to learn programming, the schools get mainly the first sort.

The arguments raised about pupils and programming hold just as much weight with adults and programming, and I am pleased to report that the majority of night classes are designed to satisfy the vague desire to learn about computers in general.

As well as the educational arguments against teaching people solely how to write code, there are other snags.

Because of the huge aptitude range that emerges in every programming class, morale problems can quickly emerge. They occur in classes where everyone has signed up specifically to write programs let alone where most of the students don't know what they want.

My personal conclusions are:

- There are great throngs of people who want to learn about computers.
- School night classes are the only way at present that they get a good, general introduction.
- If people specifically want to learn programming, then they should get up really early and go to Polytech which offers all the gear and all the expertise.

In these days when computers are big business, teaching the uninitiated about them has the potential to be even bigger. The time has never been better to advertise computer night classes but be prepared for an avalanche.

With falling rolls just round the next corner, a wonderful reputation for teaching mums and dads and uncles and cousins about computers is a powerful selling point.

FREE CLASSIFIED ADS

BITS & BYTES offers free classified advertisements of up to 20 words to members of micro clubs, students and hobbyists generally. Each word above 20 will cost 20c. If the advertisement is to appear more than once, then after the first insertion, the cost is 20c per word per issue.

The network selection

NICK SMYTHE discusses networks which are available locally.

The choice of education networks available locally comes down to Apple, Poly, BBC, TRS80s and their look-alikes.

POLYNET is the Poly system. It comes in the purchase price of a Poly system and is a medium-slow system based on 8in disks. It is well tried and value for a stationary class set.

U-NET is the Apple low-cost network. It is slow and based on 5¼in disks with a hard-disk version planned. Its merits are cost ($1-2000 for the server cards plus $3-400 per station interface) and compatibility with Apple II and the BBC machine, as well as the Pet and a range of other British micros. A low-cost but relatively unsophisticated system using the well-known RS-232 serial port.

NESTAR is the Apple-based system already in at least one school. It is quite fast (¼ Megabaud) and has sophisticated networking control suitable for the office as much as the school environment. It is expensive (1982 prices were $2-3000 for server software and $450 per station for interface cards) but it supports Apple II and III and has support scheduled for the IBM computer and ACT Sirius. All rather up-market for schools, but several have systems installed.

OMNINET comes from Corvus. It is the most attractive idea since it is designed around the concept of allowing the linkage of a wide variety of machines. It is very fast (1 Megabaud) and can extend its cheap cable over more than 1km. It uses quite sophisticated hardware in plug-in cards and by Christmas, 1982, had announced cards for eight microcomputers. It appears likely to seek to service most high-sales computers in the educational area that have provision for plug-in cards. As yet the BBC computer is not supported. The problem with Omninet is its pricing structure in New Zealand which is unlikely to attract purchasers. Each station interface is being marketed by CED at more than $1100.

ECONET, the BBC system. There is some doubt as to its effective speed. This is a crucial question since one attractive feature of the BBC machine is its apparent ability to provide a cheap network of low-cost computers. The worth of this depends on how good the network is. Available reviews indicate a 250Kbaud transfer rate, but at the same time cite examples indicating a far slower speed in practice.

CAMBRIDGE RING. This is the super-fast network developed in Cambridge for mainframe communication. The BBC Econet is planned to have a gateway interface to Cambridge installations and thence to other microcomputer networks. Details on this gateway are even less clear at present, however.

At present the most locally tested system is the Poly. For Apple users the choice is a low cost but limited capability system or some proven fast systems which at present appear overpriced. The BBC network remains the dark horse. Things should clarify in this area as more purchases are made and operating systems become more widely available.

If you are buying now bear two things in mind. One is that a network will perform as well as your task lets it. It is very hard to know beforehand what is adequate. Try and see one in operation and be aware that a two-machine demonstration is like testing a saw on butter. The other thing to bear in mind is that a bad network can mess up an awful lot of micros.

BACK COPIES AND SUBS

All subscriptions run from the next issue of BITS & BYTES after the subscription is received.

Back copies are available for all issues except number 1 (although numbers are limited).

The price for back copies is $1 PER ISSUE plus 50 cents postage and packaging PER ISSUE.

Please send your cheque or postal note with your order for back copies.

Computer Blackboard

C.E.D., distributor of Apple micros has appointed a teacher to act as its educational services manager. Paul Dickinson, who has been a prominent figure in educational computing for several years, is available to run courses, provide assistance etc. Contact Paul through C.E.D. in Auckland or through your Apple dealer.

Access Data, distributor of the B.B.C. Micro has also appointed a teacher as its educational manager. He is Joe Joyce, an ex music teacher from Auckland Grammar. Joe can be contacted through Access Data in Auckland or through your B.B.C. dealer.

Two refresher courses are planned this year entitled "Computers in Schools." One will be in the South Island and one in the North Island . . . details to be published soon in the Gazette.

Christchurch Teachers College is currently producing a video tape which shows teachers how to use LOGO. It will be available shortly.

Competition is pushing down the price of floppy disks. The lowest prices round the country are currently $38.50 a box for cash and $42.00 a box for credit.

What is your school paying? (I'm sorry but those prices apply to schools only!)

A number of the educational book reps are starting to cart round software. It is the only realistic way of being able to see before you buy so grab the next rep you see and ask what software is available . . . and if not why not?

Contributions and inquiries from teachers and so on to this column are welcomed and should be directed to Mike Wall, 56 Wayside Avenue, Christchurch 5 or C/- BITS & BYTES, Box 827, Christchurch.

Computer camp a total experience

By CATHY ARROW

Thirty youngsters happily chattering, peeking in through the windows, anticipation and excitement in the air. "What are you waiting for?" asks our six-year-old son.

"Computer Time" came the chorus from this group of 10 to 17-year-old boys and girls at the Kiwanis Huia camp, near Auckland.

After arriving Sunday afternoon, their daily routine until departure on Saturday morning was three hours morning computer activity, outdoor activity in the afternoon, plus an optional two-hours of computer time in the evening.

Next day offered morning outdoor activities and four hours of afternoon computer activity. Tutors aim at two and a quarter hours structured learning for morning sessions and about three hours at afternoon sessions. But notice that as the week progresses, the games time following each lesson steadily increases as children tire sooner. However, towards the end of the week, the girls tended to keep on

programming in preference to games.

An average of five boys to one girl attended New Zealand's first computer camps.

"Time Magazine", says Peter Carr, a Director of Computer Camps Ltd, "reveals a ratio of three boys to one girl at American computer camps."

Admiration —

One young lady who won the admiration of her fellow computerists was Charlotte, a 10-year-old with an Apple computer, plus a couple of older brothers at home. She was onto more advanced assignments in just two days.

Participants travelled from many areas including Wellington, Hamilton and Dargaville with 11 young citizens from Opotoki.

Some, like Christopher from Thames, and 12-year-old Nanaia, from Huntly, already had computers at home. Others like 12-year-old David, from New Plymouth, were looking forward to obtaining one. Many were anticipating using computers at school, while others were increasing their knowledge.

Absent were pupils from Glenfield College, Selwyn College and Otahuhu College — "Sign of the quality, depth of courses and number of computers installed there," says Peter.

Varying age groups merged well together, with most participants in the 10 to 14 age bracket. As children worked at their own rate through each assignment, younger participants were not hindered by not having dealt with algebra.

Thanks to Lions, the Auckland Savings Bank and Birthright, about 20 children were sponsored to attend. Volunteer help in both classroom and kitchen helped keep costs down. Some volunteers had enjoyed their first camp so much they returned for a second effort.

Essential to the camp's success were the 31 computers. Apples were hired from Glenfield College, System 80s from Pakuranga College and VIC's and PETS from Otauhuhu College. David Reid Electronics lent colour computers. Microprocessor Developments Ltd provided an Epsom HX 20. A Poly came from Progeni at reduced rates, and a printer was lent by CED.

Activities —

Two groups of 30 were formed for activities. Computer books were on sale. Many asked: "Can we buy games programs here?"

Accommodation, trips, food and fun were all included in the cost of $190 per child. Activities included tramping, swimming, boating, roller skating and horse riding.

Very few left the computer room for a snack available throughout the session. Apart from individual achievement on computers and the experience of living and sharing with others, the camp appeared an excellent place for personal growth.

Psychologist and co-director, Glynn Hurley, spent time with groups of 10 communicating with them, encouraging them to join discussions, express themselves, gain self confidence, and relate to other people.

Peter and Glynn are enthusiastic, eager to assess and try improvements for the camps. Course content is being evaluated and they are considering the inclusion of Logo to allow younger children to get more from the courses.

Student progress records have been taken as both children and parents have indicated a desire for more advanced camps. Parents have also expressed interest in camps for adults and the company.

Plans —

Plans are being made to hold weekend adult camp and family camps.

The organisers also envisage a data processing course over two weekends as an update for women over 30 or people returning to the work force.

Wellington and there will be computer camps in Australia this year. A camp in Christchurch is also being investigated.

In Auckland, the May and August camps will be at different venues, and already are half-booked. The response to the Christmas camps exceeded all expectations and many applications were received after the 240 places were booked.

It's less hassle regularly

Having difficulty getting your copy of "Bits & Bytes" regularly? We suggest that you become a subscriber. If you prefer to buy from your bookstore or computer shop place a regular order. This will help ensure you always get a copy.

The BITS & BYTES Computer Book Club

Books for the business

28 How to Use SuperCalc Deborah and Jerry Willis and Merl Miller

A guide to the applications and implementation of spreadsheet programs in general, and to SuperCalc specifically. Simple language, down-to-earth directions. Tells you how to organise, arrange, and manipulate your data, and is also a reference manual.

dilithium Press — Our price $37.95 **You save $2 and earn 3 bonus points**

27 Executive Planning with BASIC X.T. Bui

A collection of interactive, oriented business programs. They can be used in their existing form or as tools for management and planning decisions. Finding breakeven point, linear programming, inventory management, critical path analysis, moving averages, linear regression, financial ratio analysis, portfolio management . . . these are some of the topics covered.

Sybex — Our price $24.65 **You save $1.30 and earn two credit points**

24 Doing Business with VisiCalc Stanley R. Trost

Assumes an introductory-level understanding of VisiCalc. Beyond that it is a quick and easy guide. It has more than 50 planning and forecasting applications ranging from financial statements to master budgets, and pricing models to investment strategies. Each application is described in detail and a complete program for setting up the application in VisiCalc is noted.

Sybex — Our price $19.90 **You save $1.05 and earn two bonus points**

25 Mastering VisiCalc Douglas Hergert

Written both for newcomers to the spreedsheet program and for those who are already using it. Shows how to set up VisiCalc spreadsheets for finance, buisness and numerical applications; how to change the paramaters; how to create the formulas; how to use the DIF file function. A complete guide.

Sybex — Our price $19.90. **You save $1.05 and earn two bonus points**

26 Doing Business with Pascal
Richard and Douglas Hergert

Gives the building blocks for writing complete business programs in Pascal. Learn how to use UCSD Pascal and its extensions, modular programming, and file management techniques to design efficient, interactive programs for your business tasks. Includes listings for programs such as vendor performance analysis, accounts receivable ageing analysis, financial ratios, sales analysis.

Sybex — Our price $28.45. **You save $1.50 and earn three credit points**

How it works –

Once you've bought a book, you're in the club. So just pick out the books you want, fill in the coupon on the next page and post it in.

What you get –

We are offering savings on the cash you pay for each book PLUS we give credit bonus points on each purchase. These are stored to your credit, and a number of times a year we will offer special great buys for cash plus these points. These bargains will be available only to those with credit points. You get the books post free!

Computer books to read and use

Save as much as $20

Hurry! stocks are limited

From Bits to Bits...
A personality history of the electronic computer
Herman Lu

Bonus dividend:
Only $9.95 **You save $20 on normal retail pri**
This book takes the reader behind the scenes at the Mo School at the University of Pennsylvania in the late 1940s group of young scientists stuggle to devise a technology t would one day revolutionise the world. This is the story of people whose imagination and effort gave birth to computer.

31 Save $20 on this 220 page hardba from the Robotics Pre
Price $9.95 PLUS two dividend poi

Home Computers:
210 Questions and Answers Rich Dit

32 Vol 1: Hardware **$9.95 Save $**
(Requires one bonus poi

33 Vol 2: Software **$9.95. Save $**
(Requires one bonus poi

34 Or Vol 1 AND Vol 2 together, $18.90 **Save $**
(Requires two bonus point

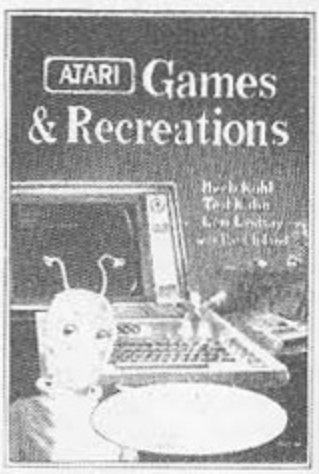
These two volumes in question and answer form give y a real feeling for what's involved in personal computing Well illustrated. Some of the section titles: Numbers, lo and building blocks; Getting into Hardware, What's It Li to Assemble a Computer Kit, Some Specific Microprocessors. What's It Really Like to Program in Machine and Assembly Language. What's It Like to Program In BASIC. dilithium P

These special deals are available only those who have already bought BITS BYTES books, or who order them from t issue, thus gaining the necessary bo points.

1 Don't, or How to Care for your Computer Rodney Zaks
An easy, entertaining guide to computer and peripheral preservation. Specific advice for the computer, floppy discs, hard discs, the CRT terminal, the printer, tape units, the computer room, software, and documentation. In the words of "Popular Computing" this book is ". . . cheap insurance".
Sybex Our price $22.75 **Save $1.20 and earn two bonus points**

2 **From Chips to Systems: An Introduction to Microprocessors** Rodnay Zaks
An excellent start to unravelling the mysteries of hardware. That's the opinion of the "Bits & Bytes" reviewer. The history of microprocessors, the microprocesor chip itself, its support components, and the design of an actual microcomputer system. Lavishly illustrated. Easy to understand. By one of the great names of microcomputing. "Good value," as the "Bits & Bytes" reviewer concluded.
Sybex Our price $30.35 **You save $1.69 and earn three bonus points**

5 Applesoft BASIC A Teach-Yourself Introduction Barrie M. Peake
A manual for New Zealanders. A one-book method of learning BASIC with the Apple, instead of picking information from two or three. "You get quite a wide view of the Apple system with one book instead of three or four," write reviewer Mike Wall in the March issue of "Bits & Bytes". Model answers. Inquiries regarding terms for class sets welcomed.
John McIndoe Our price $9.45 **Save 50c and earn a bonus point**



9 Atari Games and Recreations
By Herb Kohl, Ted Kahn, and Len Lindsay. Provides ho pre-programmed games to play. But it also gives instru readers need to improve on these games and create complex and challenging games of their own. How t fortunes, compose songs, guess riddles, do word puzzle animate cartoon characters on the Atari.
Reston Our price $27.00 **You save $ and earn 2 bonus p**

Buy now: these are current prices only!

Put them on a shelf by the keyboard

10 Microcomputer Design and Troubleshooting Eugene M. Zumchak

Considers every aspect of microcomputer design from the idea to the working system. Controller functions, the development system, read/write timing, good hardware design, the computer system, hardware testing and troubleshooting and the three basics of software design: documentation, philosophy, and technique.

Howard Sams Our price $30.75 **You save $3.35 and earn three credit points**

11 Interface Projects for the IRS-80 (Mod III) Richard C. Hallgren

For the user with some computer experience. A series of easily built interface projects allowing the discovery of the computer's capabilities. Many fully tested practice hardware projects including review of data transfer formats, analog-to-digital conversion biofeedback projects, and controlling a video playback device.

Spectrum Our price $23.25 **You save $1.25 and earn two bonus points**

12 The Alien, Numbereater and other Programs for Personal Computers With Notes on How They Were Written John Race

Dr Race has devised some interesting and unusual programs for the Commodore PET 2001 8K. He has listed the programs, but, more important, has detailed the way the programs were developed, pointed out the techniques and pitfalls, and generally provided a sound basis for the reader to design and write games and other programs for himself. A book for the enthusiast rather than the beginner. Programs suitable for Commodore 64.

Macmillan Our price $12.32. **You save 65c and earn one bonus point**

13 Program Your Microcomputer in BASIC Peter Gosling

No previous knowledge of computing is assumed. The author says this book is designed to cut in just where the manuals have allowed you to get your new micro up and running. Instructions or groups of instructions are dealt with in activities, giving a complete course in the elements of BASIC.

Macmillan Our price $13.25 **You save 70c and earn one bonus point**

14 Mastering Computer Programming P.E. Gosling

A complete, self-contained course from Britain for self study at home, or for use in the classroom. In one book, the essential information to learn programming. The language taught is BASIC. The author, a former lecturer in computing, runs a computer services company.

Macmillan Master Series Our price $9.45 **Save 50c Plus 1 bonus point**

15 Mastering Computers G.G.L. Wright

A good introduction for the initiated, or for use as a text in a computer-appreciation course. Covers the field from the basis of mainframes, through such everyday applications as bar coding to the possibilities of videotex and an electronic money system. Well written in a concise, British style, and well illustrated.

Macmillan Master Series Our price $9.45 **Save 50c Plus 1 bonus point**

16 Basic Programming on the BBC Neil and Pat Cryer

You've seen the machine on television, and this is the book prepared to go with the programme. It's designed for the new BBC, and teaches how to write programs, draw and animate pictures and graphics in full colour, design sound effects and program games. Detailed glossary.

Our price $19.25 **You save $1.05 and earn two bonus points**

Get the order in today
No charge for post and packaging

Be in the club!

GET THIS IN THE MAIL TODAY. To buy, cut out this coupon and post it to:

Freepost 125
"Bits & Bytes"
Books
Box 827
Christchurch

you address it in this way no stamp is needed) Free postage only within New Zealand.
Pay with order: Cheque, money order or fill in the Bankcard/Visacard boxes.

NAME: .....
ADDRESS: .....
.....
..... (zone) .....

I enclose payment for the above order:

☐ Visacard
☐ Bankcard
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Cardholder signature .....
Date card expires .....
Cheque Cheque No .....
Postal order ☐ Postal note ☐

Please note any machines you are interested in or other special areas of interest. .....
.....
.....

Please tick the appropriate boxes. Send me, post free, the following books		Our Price $	You Save $	Bonus Points
1 ☐	Don't, or How to Care for Your Computer (Zaks)	22.75	1.20	2
2 ☐	From Chips to Systems (Zaks)	30.35	1.60	3
3 ☐	Your Timex Sinclair 1000 and ZX81 (Hergert)	11.85	.65	1
4 ☐	BASIC Exercises for the Atari (Lamoitier)	21.80	1.14	2
5 ☐	Applesoft BASIC (Peak)	9.45	.50	1
6 ☐	Quick Keyboarding (Alexander)	6.50	.45	1
7 ☐	Parlez-vous BASIC (Campbell/Ellis)	8.50	.50	1
8 ☐	Learning Logo on the Apple II (McDougall et al)	18.05	1.00	2
9 ☐	Atari Games and Recreations (Kohl)	27.00	1.45	2
10 ☐	Microcomputer Design and Troubleshooting (Zumchak)	30.75	3.35	3
11 ☐	Interface Projects for theTRS-80 (III) (Hallgren)	23.25	1.25	2
12 ☐	The Alien, Numbereater, etc (Race)	12.32	.65	1
13 ☐	Programme your Microcomputer in BASIC (Gosling)	13.25	.70	1
14 ☐	Mastering Computer Programming (Gosling)	9.45	.50	1
15 ☐	Mastering Computers	9.45	.50	1
16 ☐	BASIC Programming on the BBC (Cryer)	19.25	1.05	2
17 ☐	Keyboarding for Information Processing (Hanson)	8.95	.57	1
18 ☐	PET Fun and Games (Jeffries and Fisher)	23.85	1.25	2
19 ☐	Some Common BASIC Programs: Atari edition	29.90	1.60	3
20 ☐	Basic Computing: A Complete Course (Crawford)	24.65	1.31	2
21 ☐	Discover FORTH (Hogan)	29.90	1.60	3
22 ☐	Discover BASIC with the Commodore VIC20 (Monro)	19.25	1.05	2
	BUSINESS BOOKS			
23 ☐	Introduction to Word Processing (Glatzer)	21.60	1.15	2
24 ☐	Doing Business with VisiCalc (Trost)	19.90	1.05	2
25 ☐	Mastering VisiCalc (Hergert)	19.00	1.05	2
26 ☐	Doing Business with Pascal (Hergert)	28.45	1.50	3
27 ☐	Executive Programming with BASIC (Bui)	24.65	1.30	2
28 ☐	How to use SuperCalc (Willis/Miller)	37.95	2.00	3
29 ☐	VisiCalc: Home and Office companion (Castlewitz)	31.98	1.65	3
30 ☐	Inventory Management for Small Computers (Atkinson)	24.65	1.35	2

BONUS POINTS DIVIDENDS (Available only to those who hold, or with this order will hold, bonus points from purchases through the club)		Our Price	You Save	You use Bonus Points
31 ☐	From Dits to Bits (Lukoff)	9.95	20.00	3
32 ☐	Home Computers Vol 1 (Didday)	9.95	10.00	1
33 ☐	Home Computers Vol 2 (Didday)	9.95	10.00	1
34 ☐	Home Computers Vol 1 AND 2 (Didday)	18.90	10.00	2

17 Keyboarding for Information Processing Robert Hanson and Sue Rigby

Enables a person to develop basic touch keyboarding skill in a minimum time. The person who completes the book will be able to key in alphabetic, numeric and symbol information; input numbers on a separate 10-key pad; keyboard information quickly and accurately; understand some of the basic vocabulary used in keyboarding. Can be used for classroom or individual, self-instruction.

McGraw Hill — Our Price $8.95 **You save 57c and earn one bonus point**

You've got a new ZX81? Then here's the book to go with it!

Douglas Hergert's Your Timex Sinclair 1000 and ZX81 starts with the real fundamentals, such as how to connect the machine to the TV set and a cassette recorder. It takes you through home to write programs for graphics, calculations, games, and more. It introduces you to BASIC.

The book also has ready-to-run programs including how to turn your ZX81 into a super calculator; how to make bar graphs to help you calculate home finances, and how to draw pictures on your TV screen.

This is really value buying at our cut price of $11.85. This is 65c less than normal retail, and you are credited with a bonus point which can be used to buy the great bonus point-only specials

3

23 Introduction to Word Processing Hal Glatzer

What a word processor is. What it does. How to use one. How to choose one. A word processor is not so likely to generate cash flow, as it is to save time, trim labour, improve efficiency, and productivity, says the author. The "Bits & Bytes" reviewer described it thus: "An ideal introduction to word processing for the home-computer initiate."

Sybex — Our price $21.60 **You save $1.15 and earn two bonus points**

22 Start with BASIC on the Commodore VIC 20 Don Monro

Don Monro is one of the snappiest, most humorous, and easiest to follow writers on beginning computing. This book with its illustrations by Bill Tidy, is an excellent guide for VIC 20 owners. The helpful exercises and line drawings make learning a snap.

Reston — Our price $19.25 **You save $1.05 and earn two bonus points**

19 Some Common BASIC Programs: Atari Edition Lon Poole et al

Seventy-six short programs to key into your Atari 400 or 800, giving you a powerful collection of financial, statistical, and maths programs. Each program is complete with source listing, documentation, and sample execution.

Osborne/McGraw-Hill — Our price $29.90 **You save $1.60 and earn three bonus points**

20 Basic Computing: A Complete Course Tim Crawford

From McGraw Hill (Canada). Provides a broad-based introduction to computer science and data processing, suitable for a variety of levels in high schools, universities or industry. Begins with questions such as What is a Computer? Where Did Computers Come From? Gives detailed coverage of computer languages, programming, program structure, logic, testing, documentation and program maintenance.

McGraw-Hill — Our price $24.65 **Save $1.31 and earn two bonus points**

21 Discover FORTH: Learning and Programming the FORTH Language Thom Hogan

Whether you are a beginner seeking information on this multi-faceted programming language or a serious programmer already using FORTH this book is a reference that should not be overlooked. Describe FORTH syntax, specifically applicable to both FORTH 79 and FIGFORTH.

Our price $29.90 **You save $1.60 and earn three bonus points.**

4 BASIC Exercises for the Atari J.P. Lamoitier

A practical and entertaining way to learn programming with Atari BASIC. Through step-by-step examples you learn the fine points of the language and how to write your own programs. This is what "Interface Age" said: "This excellent book . . . teaches BASIC without talking down to the reader." The exercises run on the Atari 400, Atari 800, and the new 1200XL.

Sybex — Our price $21.80. **You save $1.14 and earn two bonus points**

18 PET Fun and Games Jeffries and Fisher

Selected Cursor Programs

More than 30 games and puzzles, selected from more than three years issues of "Cursor" magazine. Will run on any model Commodore PET or CBM. The games include Zap, Shark, Demon, Maze, Dungeon, Yahtzee, Mad. The puzzles include Hanoi, Box, and Mind.

Osborne/McGraw Hill — Our price $23.85 **You save $1.25 and earn two bonus points**

6 Quick Keyboarding Vonnie Alexander

Sub-titled "Competent Keyboarding in 6 Hours", this book by New Zealander Vonnie Alexander has a unique method for teach-yourself competent keyboarding. A wall chart of finger positions is included.

Methuen — Our price $6.50 **You save 45c and earn one bonus point**

7 Parlez-vous BASIC R.J. Campbell and M.R. Ellis

A textbook for teaching programming on the Commodore PET. A useful source for the teacher. Written by two teachers at Palmerston North Boys' High. Indexed, and with cartoons, diagrams, and charts.

Phase 3 Electronics — Our price $8.50 **You save 50c and earn 1 bonus point**

8 Learning LOGO on the Apple II McDougall, et al

LOGO's a Piaget-based way into computing. A multi-purpose language. Non-technical, learning by doing.

Prentice-Hall (Australia) — Our price $18.05 **You save $1.00 and earn two bonus points.**

29 VisiCalc: Home and Office Companion David Castlewitz, et al

Provides extensive coverage of the popular VisiCalc program, and can be used by the novice and expert alike. For the novice it offers 40 models that can be used immediately for personal and business applications. For the expert it is a source of new ideas and techniques.

Models created with Apple 3.2 version, but will perform just as well onmachines with other versions.

Our price $31.98 **Save $1.65 and earn those bonus points**

30 Inventory Management for Small Computers Chuck Atkins

A detailed inventory-management system, written in C BASIC and running under CP/M. Minimum hardware required: 32K RAM, and two disk drives. John Varga said of this book in "Bits & Bytes" review: ". . . A good introduction to inventory management for a retail business, as well as a practical computerised solution to many of the problems presented in controlling this asset in a competitive environment.

Sybex — Our price $24.65 **Save $1.2[illegible] and earn two bonus point**

A cost benefit analysis

By CHRIS McLEOD

What are the costs and benefits of owning a computer? This month we will look at what must be considered before buying a computer to use on the farm. Most of the costs are obvious, but some of the benefits are a little more obscure.

Costs — Once you have decided on software, you can then look at computers.

The purchase price is likely to be a major cost. Make sure you include all the items of hardware necessary to run your software. This will probably include the computer itself, a monitor (TV or video monitor), some sort of storage device cassette tape drive, or disc drive, and a printer. With some machines, a terminal is used instead of a monitor.

Watch out for extra bits and pieces which may be required. An example is using an Apple computer to run CP/M software which requires a video output of 80 columns and 24 rows. You will need to add a Z80 card to the Apple, and a video card which gives the 80 by 24 display.

These additions could add more than $1000 to the basic cost so be careful when you evaluate the cost of the hardware.

By this stage, you should know the cost of software, and the operating system(s) it will run on. If the operating system is not standard on the computer you select, include it in the software cost. If the computer does not support that operating system, you have chosen the wrong computer!

Check — When buying software, check how well it is supported (ie. if you want changes made to the program, or bugs fixed, can that be done easily and preferably in New Zealand) and what sort of guarantee comes with the software.

It is not uncommon for bugs to be found in programs, so it is preferable to have it covered by a guarantee which states that any bugs found will be fixed at no cost to you. Remember that once you have your computer, you will probably want to buy more software later.

Now to items which could be called disposables — cassette tapes or disks, printer paper, printer ribbons, and perhaps a tape head or disk head cleaning kit.

Although cassette tapes and floppy disks do wear out, they last so long they could be considered permanent. The difficulty is in deciding how many you will need.

With tapes, it is probably best to allow for only one program or data file for each tape, because it is much easier to find a program if it is the only one on the tape, rather than searching through a tape looking for one program among many. With disks, you can have as many programs on a disk as it will hold.

With both tapes and disks, you must have at least one, and preferably two, backups. This means having a second (and third) tape or disk with the same programs and data files as the master tape or disk you use. The backups should be stored away from the master, preferably in another building.

It's hard to estimate in advance what printer paper and head cleaning kits you will require. If possible, talk to another computer user running the same sort of programs as you intend to.

Maintenance — Maintenance of the hardware must be considered. You can take out a maintenance contract, or stand the cost of any repairs yourself.

A maintenance contract will cost between 1% and 2% of the total cost of the hardware per month. For a $5000 system, you could expect to pay between $600 and $1200 per year. The contract should include the labour cost and replacement parts cost of any breakdown, and may include periodic inspections.

One of the big advantages of such a contract is that repairs should be carried out within a few hours of the breakdown. Make sure you know how long you can have a contract for. It is not much use if it cannot be renewed after two or three years, because it is at this time you can expect things to go wrong.

You may have to pay a little more for the contract after a certain time, but that is probably fair enough. Just make sure that the contract can be renewed, and for a reasonable length of time.

If you do not take out a maintenance contract, still include a cost for maintenance, perhaps about 1% of the purchase price. The mechanical parts of the system, such as printer and disk (or tape) drives, are the most likely to go wrong.

The cost of the system should include any other peripherals you intend to use with the computer which you would not otherwise have. Items that come to mind are electronic scales, and electronic eartag equipment.

Time — The final cost item is time. Sometimes, a computer will mean you spend more time collecting data and entering it than if you did not have the computer. This is not usually a problem because it means you are collecting more information, and hence have more information available to make better management decisions.

But if the extra information is of no real use, the extra time required is wasted. Extra time required for data collection and data entry should be offset by the benefits of improved management information.

Time can be also taken up writing your own programs. Unless you are very interested in computer programming as a hobby, do not write your own programs. Look around for some commercial software which will do the job, or approach a professional programmer who has a good knowledge of farming.

Unless you are a skilled programmer (and it takes much practice), it takes a long time to write a program — much longer than you would think. Commercial software may be expensive, and a professional programmer even more so; but they are cheap alternatives unless you place very little value on your time.

Benefits — Benefits of using a computer on the farm can be considered under two general categories — improved management information, and savings in time.

Improved management information is usually by far the more important. With better information at your fingertips, you are able to make much better management decisions, leading to increased income and/or decreased expenses.

But this is very difficult to measure in dollar terms. A lot of the information collected by farmers is for use by others. Most of the financial information collected is for the preparation of accounts for taxation purposes, lending agencies and the like.

This information is assembled in such a way so that it is of little use to the farmer for management purposes. If assembled on a computer, the information could be used by the accountant for traditional reasons, and then reassembled into a form of use to the farmer.

One big advantage of using a computer for financial information is that "what if?" studies can be made. If gross margin calculations are to be done by hand, it is unlikely many different options will be considered because of the time it takes to recalculate a new gross margin. However, once you have the basic information in the computer, you can alter one or two factors (eg. yield) easily.

A much better idea of the sensitivity of the enterprise to various changes can be gained, allowing better decisions to be made. The capacity to easily carry out "what if?" studies on the computer is one of the most powerful tools in management.

Continued on page 45

In the Belly of the Beast

Addressing memory

By Gerrit Bahlman

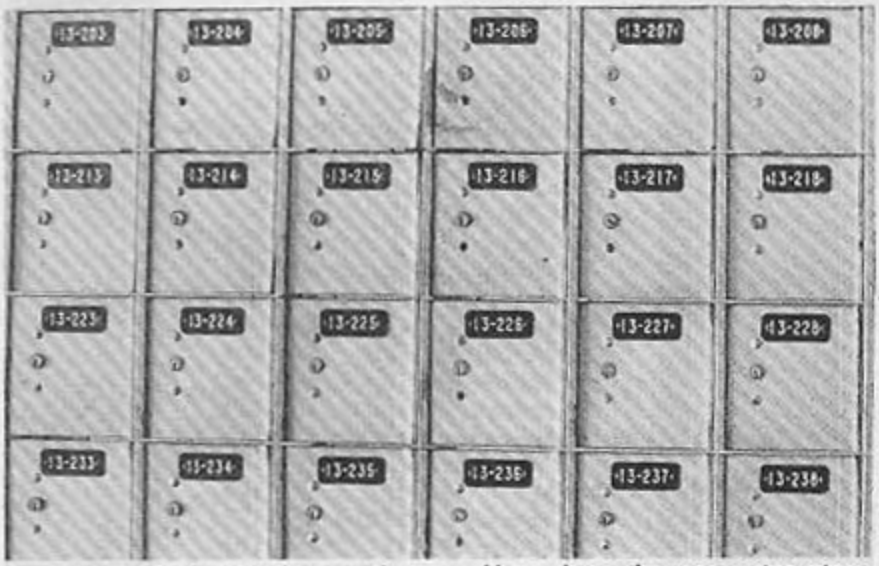
To now we have concerned ourselves with how numbers and letters can be stored using binary digits. In this chapter of the continuing saga of computer intestinals we will look at addressing computer memory.

In any real task that the computer is used to perform a large number of data items will be involved. By data items, I mean letters, numbers and so on as they combine to form words such as names, addresses, ages, values, etc. An average job will involve hundreds if not thousands of individual symbols represented by 8-bit patterns. Notice "by 8" from which we get "byte".

If you remember when I first introduced the idea of a computer word I emphasised that it was an ambiguous term. What one machine thinks of as a word depends on how many bits or bytes of stored information it can access at once. The more complex machines allow varying word lengths depending on the type of machine-code instruction being used. So there is no definite answer even within one machine.

Physically, the computer's memory will have a definite width and this could be used as its word length, however the width of the memory can vary even within the same range of machines so that a word defined in that way would not be particularly useful. In particular, older computers such as the IBM370 had varying physical memory widths yet as far as the programmer was concerned it made no difference.

Another way of thinking about word size would be to decide that a word was the number of bits that could be addressed by



machine-code instructions rather than the number of bits that are read at one time. This idea also fails to settle the problem because most machines provide some 1-bit operations so a word would then be thought of as a bit, clearly that would be of little use to anyone.

Obviously a compromise has to be struck and so the average number of bits that are used in the machine-code instructions is thought of as the word length of a machine. In a particular job that length should be the most efficient to use in a calculation and would allow the job to be done fastest. Common word lengths are 12 (PDP-8), 16 (PDP-11) and (HP 2100), 18 (PDP 15), 24 (ICL), 32 (Prime), 36 (DEC system 10) and 64 (CDC) bits. But that is not to say that these are the only lengths of information that can be accessed from the computer's memory.

How does the computer store all the pieces of information that particular programs will use? I don't mean physically; rather how can all the information be saved and found again afterwards?

One analogy frequently used for computer memory is that of mailboxes or pigeon holes. Each mailbox is numbered and to store something there you just have to use the correct number. To get it back you have to use the same number again. The main

BEGINNERS

difference between a mailbox and a computer's memory is that in the computer once you remove the item from the memory *mailbox* it's still there! It sounds strange but it's a bit like playing a record or a cassette tape. Even though you have played the music its still there and can be played again.

Each box-holder has a unique box number, its *address*. This address serves to identify that box and only that box. In the computer each location in memory has a unique number, called its address, which is tied to it. That number is used to *write* to memory and *read* from memory. Writing to memory destroys what was held there originally. You can only save one parcel of information at a time in the mailbox. However, reading from memory involves taking a copy of what is there rather than actually removing the parcel. Reading from memory is non-destructive.

Usually, memories are addressed from O to N-1 where there are a total of N memory locations. So if your computer had 256 memory locations then they would be numbered: 0,1,2, . . . 255.

Each memory location would store L bits at a time and this would be the same for each location. If your 256 memory location machine had an 8-bit word length then you could store the character 'A' which looks like this in binary: 01 000 001, in memory location 56. Later on you could retrieve it by asking the computer.

Addressing memory by number is the most common method and all machines generally available use it. There are other concepts used such as "content addressing' by which a word is specified by giving the value of part of its contents. The computer then returns all locations which have that bit search pattern. However we will leave that for now. In the next article we will look at addressing in a little more depth.

Basic BASIC

Continuing a series for beginners.

By Gordon Findlay

Thus far in our explorations of BASIC we have been restricted to the use of so-called SIMPLE variables. Each variable has been able to store or remember just one value, whether it be a number or a string. This is a bit restrictive, particularly if you don't know how many variables you are going to need, or if you have a lot of them. Hence the need for ARRAY or SUBSCRIPTED variables.

The general reaction at the introduction of arrays is one of horror — it all sounds far too difficult. But it sounds more difficult than it really is. Let's sneak up on arrays, and see if we can make some sense out of them.

Here is a simple example which forces the use of arrays. It isn't very realistic, but I will include some more reasonable uses of arrays later in this article. Let's imagine we are using a program to maintain our financial records. All expenses are categorised: food might be category 1, magazines category 2, entertainment category 3, and so on. We enter expenses by giving the category and the amount; and add the amount onto the total for the appropriate category. Part of the program might look like this.

```
100 PRINT "TYPE CATEGORY, THEN AMOUNT:";
110 INPUT C,AM
115 IF AM = 0 THEN GOTO 220
120 IF C=1 THEN T1=T1+AM
130 IF C=2 THEN T2=T2+AM
140 IF C=3 THEN T3=T3+AM
150 IF C=4 THEN T4=T4+AM
160 IF C=5 THEN T5=T5+AM
170 IF C=6 THEN T6=T6+AM
180 IF C=7 THEN T7=T7+AM
190 IF C=8 THEN T8=T8+AM
200 IF C=9 THEN T9=T9+AM
210 GOTO 110
```

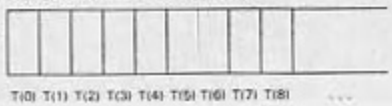
In line 110, the category number and the expense amount are obtained from the keyboard. If the amount is zero, line 115 sends the program to line 220 (not shown here); otherwise the category C determines what happens in all the IFs. Depending on C, one of the totals T1 to T9 is increased. But look at all the IFs! If you are trying this with a machine, you will have got sick of typing statements which are more or less identical. Wouldn't it be grand if all the lines 120 to 200 could be replaced by: 'TC=TC+AM' building the value of C into the variable name? So if C was 7, 'TC' would mean T7, and so on. THIS ISN'T LEGAL BASIC, but a minor modification is.

The modification requires two things. First, some punctuation is needed, and the statement must be written T(C)=T(C)+AMT. Secondly, and most importantly, the 'computer' must be told that T is not an ordinary variable, but is special. This is done in a DIM statement.

In the example above, T has become an array, or collection of values. T can contain a whole lot of values, and the one to be used must be specified by giving a number, or SUBSCRIPT. The subscript may be a number — e.g. T(3) — or a variable — e.g. T(C) — in which case the value of C determines which member of the array is meant.

A parallel might help here. There are two kinds of addresses in this world. Some, very few, people have exclusive addresses, such as 'Buckingham Palace', 'Vogel House', and the like. Others of us have only a street address, such as Somerfield St., and have to qualify it with a number — so the address becomes 87 Somerfield St. If you change the punctuation a little, this becomes Somerfield Street (87), which is still recognisable, and is exactly analagous to an array variable. The street is a collection of addresses, and to isolate one house the number must be specified. The more exclusive addresses are like simple variables, such as AMT and C — they contain just one value.

Another way of thinking of arrays is as a row of boxes, each numbered. The subscript specifies the position of the box:



The DIM statement was mentioned above. It is vital to let the computer know that a variable represents an array, so that subscripts are expected. It is also needed to tell the machine the size of the array. Here is an example:

```
DIM T(20)
```

This statement says 'T is an array, so expect subscripts. The largest value the subscript can have is 20'. Most BASICs will set up 21 spaces for T — T(0), T(1), T(2), T(3), . . . T(20); although a few don't include T(0).

Using an array the little program above looks like this:

```
10  DIM T(20)
    . . .
100 PRINT "TYPE CATEGORY, THEN AMOUNT:";
110 INPUT C,AM
115 IF AM = 0 THEN GOTO 220
120 T(C) = T(C) + AM
210 GOTO 110
```

Not only shorter, but also easier to follow after a little practice.

Each array can be dimensioned only once in a program. Several arrays can be dimensioned in one statement, e.g. DIM X(100), Y(100), T(20). Many versions of BASIC allow a sort of default dimensioning, in which an apparent array which hasn't been dimensioned is treated as if it had been dimensioned with a size of 10. It is definitely bad programming practice to use this — dimension all arrays specifically yourself. I always find the use of a zero-th element confusing, because the third element is called T(2) and so on, so I usually ignore the zero subscript, and start at 1. You might prefer otherwise.

When should arrays be used? The best general advice I can give you is: whenever a lot of values are going to be treated equally. As examples — a collection of account balances, of names and addresses, or of prices, or whatever. In games, an array will often be used to store a lot of positions on the screen, so to move a player, or an invader, means to draw it at another position found in the array.

There are many other possibilities. String arrays are usually accepted (although not in the Sinclair machines, or Apple Integer Basic).

How much more we pay in N.Z.

By PIP FORER

When computing was all mainframe based, it could be said that computing in New Zealand was expensive and often practised on equipment that was behind the times. The small market and infrequency of re-equipment mean that innovations were often slow to reach us. With the advent of the microcomputer the time-lags for the introduction of new equipment have been whittled away in many areas. It was a matter of years before the early TRS-80s, Apples, and PETS diffused from the United States to New Zealand. Today, new models can be available within weeks of release in their home countries and few machines take more than a year to reach the market in New Zealand (if they are to reach it at all). Recently announced products such as the Apple IIe and Pansonic 3000 have reached New Zealand within three or four weeks of their international launching. Our technology lag has consistently shrunk.

Expense is a different matter. Although real costs of computing have dropped the relative cost of buying and running a computer in New Zealand is still reckoned to be high. This is generally thought to be so even in education where no sales tax applies. It is a cause of public concern when the 40 per cent sales tax is added. Just what is the general relative cost of microcomputing in New Zealand? The graphs below examine the relative costs of six popular machines in four market places: America, Australia, Britain, and New Zealand. We look at six popular machines. These include a small introductory machine (the Sinclair ZX 81), the popular and large VIC-20 and three machines near the top of the personal 8-bit market (the Apple II +, Atari 800, and BBC microcomputer). We also look at one 16-bit machine, the widely praised ACT Sirius I. We are looking at the basic configuration offered for sale. This usually excludes tape drives, disks, or a monitor. The exception is the ACT Sirius which comes standard with monitor and twin disk drives.

Measuring costs.

International comparisons are hard to make. In this case we have taken quoted listed prices for the basic machines from advertisements in a variety of micro journals: in America, "Byte," "Creative Computing," and "Interface Age"; from Britain, "Windfall" and "Practical Computing"; from Australia, "Australian Personal Computer"; from New Zealand, "Bits & Bytes" and trade information. The machines were priced on a standard configuration as far as possible using magazine issues for September to December 1982. From these issues the cheapest "non-special" price for each machine was used.

This procedure has certain disadvantages. For a start the relationship between price advertised and price paid over the counter can vary quite a lot. In highly-competitive markets such as the United States bargaining at purchase time can often get significant discounts on list price. This is not true for less competitive markets. Then again machines are not always sold in the same configuration in different countries so adjustments have had to be made to get prices comparable. Finally fluctuating currency rates can alter the fine detail of an international comparison from one month to the next. Having said all that this is probably still the nearest you can get to a fair comparison and reflects the comparative costs of hardware in different countries quite well. All prices are retail, across the counter with all taxes paid as advertised except for New Zealand. Here the two positions indicate the cost to an educational user (tax exempt) and the normal pricing with 40 per cent sales tax added.

How NZ stands

As we have said comparing prices internationally is not at all straightforward. Apart from minor differences in similarly named machines in different countries exchange fluctuations and different market conditions also affect the picture. In our case in point the real (over the counter) U.S. prices are almost certainly much lower due to the fiercer local competition. If we took this into account the relative cost of the other markets would rise. One phenomenon is that the machines that arrive late in New Zealand are not always those released at an early date overseas or the cheapest in a relative sense. The machines that are available in New Zealand after quite a delay from overseas are often the most popular brand leaders and so, when they do get here, are still priced high as a reflection of international demand for them. The I.B.M. Personal Computer is a case in point. Less popular machines, which may be technically just as sound, may arrive earlier and be cheaper than prestigious counterparts.

Overall, though we can draw a few general conclusions. The consumer in New Zealand would, without sales tax, be delivered machines at least 50 per cent over tax-paid cost in Britain or America and at a level almost comparable to the Australian tax-paid price. The differences must reflect distance from markets, the level of local competition, and difference in dealer mark-ups.

In New Zealand we can see the additive effect of sales tax on relative computing cost. In many cases it amounts to the cost equivalent of the effect of thousands of miles of ocean, a small local market, low competition, and taxes paid by overseas consumers all combined. The small user might be forgiven

Continued on Page 41

Alternative machine code programming

By John Durham

It is widely assumed among programmers of microcomputers that there is only one practical way to write programs in machine code. In a recent article by Gordon Findlay, entitled "the art of machine code programming" describing the "editor assembler method", the author encourages the reader to believe in this assumption.

There is another way, practised by increasing numbers of people, described by Mr Findlay as "hardy souls who can do without an assembler", which may suit the more creative and ambitious among programmers better.

The machine code monitor has been with us ever since editor assemblers appeared, and probably long before then was used as an effective means of writing, debugging and copying machine code programs.

The more entrenched assembly language programmers often begin to boggle at the mention of such a tool for effective machine programming, but in fact it can be simpler to use and produce better programs (and faster too in the hands of a skilled user), than any editor assembler.

To begin with then, here is a comparative list of things you need to begin work using both methods.

Editor Assembler
Z-80 Instruction List
Editor-Assembler Programs
Machine Code Monitor Program
Linker Program
10–16 hours instruction or
2–6 weeks of hard study

Machine Monitor
Z-80 Instruction List
Machine Code Monitor Program
4–8 hours experienced instruction

Both users would also benefit from having a copy of a good book on assembly language programming as a reference guide when preparing difficult programs.

Machine monitor programming is quicker and easier to learn because you do not have to master the complex assembler syntax requirements or learn to use a linker program, although for monitor programming you learn it in somewhat greater depth than for assembler programming.

When writing programs using these methods, the procedures needed and the time taken vary in a similar fashion. The following is a generalised "basic style" illustration of how you prepare a program using both methods.

Editor Assembler

1 Write source file
2 Assemble (test for errors)
3 If correct, then go to 5
4 Correct syntax: go to 2
5 Assemble to tape
6 Save source file on tape
7 Go back into basic
8 Load monitor
9 Load object tape
10 Set breakpoint in routine
11 Run routine: examine break
12 If OK go to 16
13 Problems!: load edtasm
14 Load source file
15 Write correction: go to 2
16 Load edtasm
17 Load source file
18 Assemble to printer
19 End

Machine Monitor

1 Write routine on paper
2 Write routine with monitor
3 Save routine on tape
4 Set breakpoint in routine
5 Run program: examine break
6 If OK, then go to 9
7 Look before breakpoint
8 Write correction: go to 3
9 If unfinished then go to 4
10 If OK, then save on tape
11 Disassemble to printer
12 Add your own comments
13 End

Full documentation is essential if anyone else is ever to read and understand what you have written, and even more importantly you must be able to understand your own work upon returning to it in a few months time. In this sense an editor assembler provides better documentation than a monitor, but you are certain to pay for it with your time, labour and money if you choose this route.

Despite all this, most editor assembler programmers fall back on the excuse that "writing programs is so much easier with an editor assembler".

There is so little truth in the adage that it is surprising that it has persisted in programming circles for so long. It might be better interpreted to mean "I'm only used to decimal numbers, and I can't really picture myself writing in mind boggling amounts of hex code, let along enjoying it!".

In reality, there is far less to it than is required if you have to handle the syntax requirements of an editor assembler. The principles of machine code programming are identical whether you use machine code monitors or editor assemblers, and it is of benefit to the creative powers of many people to have no worries about whether the particular syntax for an instruction is acceptable to the assembler or not and simply write the program.

I sit before the computer with an instruction list on my lap, the program on one side and type in the code. After having done this a number of times, it is only necessary to look at the list for about ten percent or so of the more unusual instructions, since the common ones become committed to memory with time, and I need only occupy my mind with the program itself.

Suitable monitor programs for use as described above should have a good disassembler, easy direct code entry, good breakpoint actioning and reporting, binary/hex/decimal mathematics ability and conversion at least from hex to decimal. The mathematics capability is needed to help you calculate the size of a program or the displacement of a relative jump. It should also have tape/disk commands and the ability to present memory contents to screen or printer in a variety of forms, such as hex or ascii.

These are minimum requirements only, and the following monitors far and away exceed these specifications: Tasmon (TRS-80 & System 80); RSM 2D (TRS-80 & System 80); Beemon (Microbee).

In case you still have any doubts that worthwhile programs can be produced in this way, it may be interesting to note that Beemon was written for the Microbee using a machine code monitor and writing in hex code.

If you don't know anyone who can help you get started writing programs, than I would be glad to help. Write or phone:

John Durham
16 Hudson Ave
Upper Hutt
Phone: Wellington 286-786

NEW ZEALAND'S LOWEST PRICED HOME COMPUTER

Cat No. X-1600

that's the amazing DICK SMITH WIZZARD

FULL COLOUR AND SOUND!

Years Ahead

The Dick Smith WIZZARD Home Computer uses the very latest technology available. Most of the comparable machines around were designed two, three or even more years ago. And at the speed electronics is advancing today, that's a long, long time.

Compare the Quality

The Dick Smith WIZZARD has really outstanding picture quality! Its resolution (49,128 pixels) is far greater than the most popular machines on the market. The result: a fantastically better picture!

FREE BASIC CARTRIDGE

Comes with a Special 'PLUG IN' Computer Cartridge

The secret of the Dick Smith WIZZARD is its BASIC plug-in computer cartridge which provides all of the powerful programming facilities of a personal computer. This gives the WIZZARD tremendous flexibility for further expansion.

Full Typewriter-Style Keyboard

Yes - a deluxe 'QWERTY' keyboard with high tactile response keys. The whole keyboard is easily removed for service (if ever required!) and there's provision for joysticks to be plugged in.

Compare the Price

The only comparable computer system available anywhere in the world costs over $200 more than the Dick Smith WIZZARD. It's ready to use - including the deluxe keyboard and cartridge. No expensive extras to buy - just to get going!

FREE! A superb computing manual 'Dick Smith's Fun Way into Computing' - written especially for the Wizzard. You won't believe how easy it is to understand computing. Cat B 6195 NORMALLY VALUED AT $9.95.

It's ready to use - including the deluxe keyboard and cartridge. No expensive extras to buy - just to get going!

ONLY $495 P & P $5.50

MAIL ORDERS WELCOMED

PORTERFIELD COMPUTERS
103 Dominion Road, Mt Eden, Auckland
Telephone 686-084

7 DAY TRIAL OFFER

If you're not completely happy, you can return the WIZZARD within 7 days in original condition & packing for a full refund! You owe nothing-not even an explanation. (SPECIALLY EXTENDED TO 14 DAYS FOR MAIL ORDERS)

DSE/NZ0148M/JCP

DICK SMITH ELECTRONICS

98 Carlton Gore Road, Newmarket, AUCKLAND. Ph: 504-409
DEALERS THROUGHOUT THE COUNTRY
Mail Orders Private Bag, Newmarket, AUCKLAND

Orbital prediction

By GRAHAM BAKER

This program originally came to me last year about the time UoSAT was launched. But at that time, I did not get it going. About two months ago another version arrived thanks to Doug ZL 1 AFW.

This was entered and ran first time. Several modifications were made to tidy up the operations and make the orbital data more clear for entry. Note date of data entry, -7 Nov = 24 Oct! Also 85 August = 24 October.

Keplerian elements are available from AMSAT report or on 28.878 MHz at 2200Z Saturdays (9 a.m. NZDT Sundays).

It is important to remember this program is for circular orbits and so is not super accurate, although definitely within a minute a month on the higher altitude satellites.

One user comment was: "My computer always gives results to nine decimal places". Try this routine for the printed variables. A = 100: C = INT (B*A + 0.5)/A: REM two decimal places, A = 10 for one decimal place and rounding is taken care of.

```
 0 REM . PREDICTIONS FOR       .
 1 REM . CIRCULAR ORBITS       .
 2 REM .                       .
 3 REM . ORIGINAL PROG BY      .
 4 REM . D.M.ROBINSON ZL2QX    .
 5 REM .                       .
 6 REM THIS PROGRAM NEEDS THE EQX
INFO FOR THE FIRST DAY OF THE MONTH
 7 REM INFO ENTERED ON LINES 3000-
 8 REM STEP TIME IS FOR THE PRINT
OUT INTERVAL. YOUR LAT AND LONG ON
LINE 70
 9 REM LONG IS LONG WEST.  VALUE IS P9)
 FOR AUCKLAND.
 10 PRINT'(A07,A08,U09,RS#)'
 15 INPUT'NAME OF SATELLITE';B$
 20 IFB$='A07'THEN3010
 21 IFB$='A08'THEN3020
 22 IFB$='U09'THEN3030
 23 IFB$='RS3'THEN3040
 24 IFB$='RS4'THEN3050
 25 IFB$='RS5'THEN3060
 26 IFB$='RS6'THEN3070
 27 IFB$='RS7'THEN3080
 28 IFB$='RS8'THEN3090
 31 GOTO10
 70 KO=-36.84:K1=185.17
 71 P9=6.28319/360
 100 PRINT'DAY OF 'M$;:INPUTD6:IFD6
<DTHEN100
 110 IFD6>32THENPRINT'ARE YOU SURE'
 120 H1=360-(HO-90):IFH1>=360THENH1
=H1-360
 130 A=(60*H)+M+(S/60)
 140 N=N+1:A=A+C:C=C+T9:IFC>360THEN
C=C-360
 150 IFA>1440THENA=A-1440:D=D+1
 152 IFD<D6THENGOTO140
 160 IFD=D6THENH=INT(A/60):M=INT(A-
(H*60)):S=A-((H*60)+M):S=INT(S*60)
 170 LO=C:N1=N-1:T1=H:T2=M:T3=S
 1150 XZ=6367/(A0+6367)
 1160 GOSUB2370
 1170 M0=X7
 1210 PRINT:INPUT'STEP TIME';S5
 1280 PRINT'.....'
 1281 N1=N1+1:PRINT'ORBIT NO.';N1,'
FOR 'B$
 1290 IFLO>=360THENLO=LO-360
 1300 PRINT: PRINT'EQX AT'T1';'T2';
'INT(T3)'GMT':PRINT'AT'LO'LONG'
 1330 F=0
 1340 FORI=INT(P/2)TOINT(P)STEP(S5)
 1380 X1=(SIN(6.28319*I/P))*COS(H1*

 1382 GOSUB2220
 1384 S0=X8
 1390 GOSUB1850
 1430 IFS1<=180THEN1450
 1440 S1=S1-360
 1450 L5=K1-S1
 1460 IFABS(L5)<=180THEN1510
 1470 IF(K1-S1)<0THEN1500
 1480 L5=L5-360
 1490 GOTO1510
 1500 L5=L5+360
 1510 GOSUB1920
 1550 IFD<>0THEN1580
 1560 IFF=1THEN1690
 1570 GOTO1630
 1580 GOSUB2020
 1590 GOSUB2110
 1600 GOSUB2180
 1605 T7=T1*3600+T2*60+T3+I*60:T4=I
T(T7/3600):T5=INT((T7-T4*3600)/60)
 1607 T6=INT(T7-T4*3600-T5*60)
 1608 IFF=0THENPRINT:PRINT' TIME
  AZ      ELEV    RANGE'
 1610 PRINTT4;T5'  'INT(CO);TAB(17);
INT(E);TAB(24)INT(R):F=1
 1630 NEXTI
 1640 IFF=1THEN1690
 1650 PRINT:PRINT'OUT OF RANGE DURI
NG THIS ENTIRE PASS':PRINT
```

Continued on page 38

Two-page graphics on the PET

By PAUL CULL

The PET's graphics printing is very slow. To fill the screen takes from one to eight seconds using PRINTs, and about three seconds using POKEs. The program presented in this article takes about 1/20th of a second to display a full screen.

The machine language routine to do this was written on an 8K Upgrade ROM PET, and should run without modification on any 8K Upgrade/4.0 ROM PET/CBM. It won't work on VIC 20s or 80-column CBMs.

Some computers, such as Apples, have two graphics pages, allowing one to be displayed while the other is being prepared.

This program creates two 1000 byte pages at the top of user RAM and allows them to be PEEKed in and POKEd to just like TV RAM.

Readers of last month's VIC column by Brian Bullen would have noticed a diagram showing the memory map for three different versions of VIC memory expansion which didn't appear to relate to Brian's article. In fact it should have appeared with Peter Archer's article in March and we apologise for any confusion caused.

Once one of these buffers has been set up, a SYS to the appropriate machine code routine will display it.

Before you use this program, you should reset the top of memory pointers to below the graphics pages. This prevents BASIC invading them.

The statement to do this on 8K PET/CBMs is POKE 52, 48: POKE 53, 24 (for Old ROM PETs, use POKE 134, 48: POKE 135, 24).

Along with routines to print the buffers, I have included a program to clear these pages. This is because to POKE a buffer clear in BASIC would take about three seconds. The pages must be cleared before use as they contain reverse asterisks on power up.

The addresses of the machine code routines are:

SYS 826 to print page 1.
SYS 837 to print page 2.
SYS 887 to clear page 1.
SYS 898 to clear page 2.

The two pages live from 6192 to 7191 for page 1 and 7192 to 8191 for page 2.

If your Commodore has more than 8K, you can still use this routine. But the two pages will be stuck right in the middle of RAM, leaving you with only 5K usable.

You could relocate the buffers by changing the low and high bytes of the addresses in lines 100, 110, 130, 140, 260, 270, 290 and 300 of the BASIC loader program. At present, these are 48 (low) and 24 (high) for the address 6192 and 24 (low) and 28 (high) for the address 7192.

For Old ROM PETs, the number 253 and 254 in lines 150-190, 210, 320, 350-370 and 390 should be changed to 6 and 7 respectively (locations 253 and 254 are used to hold temporary pointers).

Setting up the pages still takes the same time using POKEs. But once set up, they can be displayed very quickly to animate PET graphics.

A new screen can be prepared while the user is still looking at the last one — something impossible with conventional POKEs or PRINTs on the screen.

```
10 REM BASIC LOADER PROGRAM
20
30 FOR J = 826 TO 944
40   READ A
50   POKEJ,A
60 NEXT J
70
100 DATA 169, 48, 133, 1
```

Continued on page 45

Quicksort routine

By GORDON FINDLAY

First off, some unfinished business. In the March issue I gave some ROM calls which should be of use to machine-code programmers. Russell Lane, of Wanganui, has kindly pointed out that I gave the same address for KEYIN and CHROUT. Sorry, my mistake — CHROUT is located at 0033H. In the text relating to the 16-bit comparison routine CMP16, which compares the DE and HL register pairs, the DE pair somehow got changed to BC in one place. While an instruction to swap the BC and DE pairs would be nice, this isn't the way to do it.

Max Areboni listed a couple of routines he has used:
HEXBYT (2BIC) converts a string of decimal digits (stored in ASCII) to hex, leaving the hex value in the accumulator. This works for values between 0 and 255 only — if the result is greater then a FC ERROR is given. Most registers are used, so save any you need.
HEXINT (1E5AH) does the same for a two-byte integer (0 to 65535), leaving the result in the D (least significant byte) and E (most significant byte) registers. This time a value too large gives a OV ERROR. Again, most registers are used.

Max also reports 'a feeling' that Disc BASIC and DOS both use the alternate register set, at least for TRSDOS Model I. Can anyone be more definite?

Now for something completely different, as they say. I like to get a bit of variety into these columns, so this time, SORTING. No, I'm not going to give a detailed discussion — there are whole books written on sorting. The most common methods for sorting are the Bubble sort, Insertion sort, and Shell sort. People use these because they can follow what is happening. But these are slow methods. The fastest general purpose methods I know of are called QUICKSORT, and HEAPSORT. They have been around for years, but not many people use them. That is probably because not many of us understand how they work. But that doesn't matter — at least I know that they do work!

Below in listing 1 is a subroutine which you are welcome to use to sort an array A( ) into ascending order. To use the subroutine you need to:
1. Assign values to A( ).
2. Give N the value 'number of elements to sort'.
3. Dimension a small auxilliary array — AUX (20,1) is bound to be big enough.

Then just call the subroutine! The routine is quite quick by BASIC standards — I will translate it into machine code someday and then really see some speed.

Obviously the method used here isn't original — the algorithm was published in the middle 60's — but this implementation of it is. The time required doesn't increase very much as the array becomes larger.

The demonstration program sorts an array of random characters on the screen. This will give some idea of what is happening. This isn't terribly fast because of all the PEEKing and POKing of values to and from the screen. You will be able to see how the quicksort sorts each character into the correct half of the array, then sorts each half by halves again, continuing until the part of the array being worked on is just two elements. The array AUX holds the beginning and end points of each part of the array.

I always use this subroutine now, and regard it as a 'building block' which I call up as needed.

THE SUBROUTINE

```
9990 '  Quicksort subroutine
10000 IF N=0 THEN RETURN 'empty
10010 PA=0:PB=0 'pointers in array
10020 PC=1:PD=N
10030 DN=PC:UP=PD:FLAG=-1
10040 IF A(DN) <= A(UP) THEN GOTO 10070 'change to >= for descending sort
10050 PA=PA+1:FLAG=-FLAG
10060 TEMP=A(DN):A(DN)=A(UP):A(UP)=TEMP
10070 IF FLAG=1 THEN DN=DN+1 ELSE UP=UP-1
10080 IF UP > DN THEN GOTO 10040
10090 IF DN  < PD - 1 THEN PB=PB+1:AUX(PB,0)=DN+1:AUX(PB,1)=PD
10100 PD=DN-1
10110 IF PC < PD THEN GOTO 10030
10120 IF PB=0 THEN RETURN ELSE PC=AUX(PB,0):PD=AUX(PB,1):PB=PB-1:GOTO 10030
```

DEMONSTRATION

```
10 DIM A(400),AUX(20,1)
20 CLS
30 FOR I = 1 TO 400: A(I)=RND(159)+32:NEXT
40 ' display array
50 FOR I=1 TO 400:POKE 15360+I,A(I):NEXT
60 'sort it
65 N=400
70 GOSUB 10000
80 'all done
90 PRINT@896,"Finished";:END
9990 '  Quicksort subroutine
10000 IF N=0 THEN RETURN 'empty
10010 PA=0:PB=0 'pointers in array
10020 PC=1:PD=N
10030 DN=PC:UP=PD:FLAG=-1
10040 IF A(DN) <= A(UP) THEN GOTO 10070 'change to >= for descending sort
10050 PA=PA+1:FLAG=-FLAG
10060 TEMP=A(DN):A(DN)=A(UP):A(UP)=TEMP
10062 ' swap on screen too
10065 Z=PEEK(15360+UP):POKE 15360+UP,PEEK(15360+DN):POKE 15360+DN,Z
10070 IF FLAG=1 THEN DN=DN+1 ELSE UP=UP-1
10080 IF UP > DN THEN GOTO 10040
10090 IF DN  < PD - 1 THEN PB=PB+1:AUX(PB,0)=DN+1:AUX(PB,1)=PD
10100 PD=DN-1
10110 IF PC < PD THEN GOTO 10030
10120 IF PB=0 THEN RETURN ELSE PC=AUX(PB,0):PD=AUX(PB,1):PB=PB-1:GOTO 10030
```

Multiple programs

Martin Downey is filling in as BBC columnist this month. Pip Forer is overseas.

By MARTIN DOWNEY

A feature of most pocket computers is the ability to store a number of programs in memory at the same time and run them independently. This can be achieved on most micro-computers by a few PEEKs and POKEs. On the BBC it is even easier. The following steps show how to set up two programs in memory each of which can be chosen by pressing one of the FUNCTION keys. The technique can be repeated for up to ten programs (one for each FUNCTION key).

```
PRINT PAGE (displays a number)
*KEY 1PAGE=(number above) ¶M
(Enter/Load 1st program e.g.)
10 REM PROGRAM ONE
PAGE=LOMEM+256
LOMEM=PAGE+2
?PAGE=13
?(PAGE+1)=255
PRINT PAGE (displays a number)
*KEY 2PAGE=(number above) ¶M
(Enter/Load 2nd program e.g.)
10 REM PROGRAM TWO
```

Although I haven't had time to test my idea thoroughly it appears to work and is very useful for keeping utility programs (e.g. a program that simplifies the creation of programmable characters) in memory during program development. The earlier programs should not be changed but the last program entered can be edited as usual.

TRS-80 look-alike

Before the BBC's official release a rumour was going round that it would be able to imitate the TRS-80, the Apple and the PET. Although it is true that just about everything they can do, the BBC can do, there is by no means any direct compatibility. (Wrong again, "MICRO-80"). However, as a TRS-80 owner for more than four years, I was interested in getting TRS-80) graphics on the BBC and indeed, it can be done (and in colour!).

The following program displays the 64 graphics characters on a TRS-80.

```
10  FOR I=128 TO 191 STEP 16
20  FOR J=0 TO 15
30  C=I+J
40  PRINT CHR$(C); " ";
50  NEXT J
60  PRINT: PRINT
70  NEXT I
```

To get the same display on a BBC add the following lines:

```
 4  MODE 7: REM teletext
 6  white graphics$=CHR$(151)
14  PRINT white graphics$
34  C=C+32: IF C>191 THEN C=C+32
```

Of course this is just in black and white. You do in fact have the choice of six more colours for both foreground and background. Not only that, you can also have "separated graphics", which gives a border around each cell. Readers may well ask why you would want such graphics on a machine that has very high resolution dot graphics, programmable characters, and powerful PLOTing commands. BLOCK graphics have advantages in producing pictures quickly and easily with minimum memory requirements. Besides, to a TRS-80 hacker like myself their chunky appearance has a certain mosaic beauty.

Of course MODE 7 wasn't intended to make the BBC compatible with the TRS-80. Its primary objective is for compatibility with the TELETEXT and PRESTEL communications systems. Although these services are not yet in use in New Zealand they are certainly the way things are going to go.

Talking of rumours. I recently heard from an Australian who has been associated with the BBCs development. According to him the Acorn designers have imbedded their names in an unused portion of the ROM. A simple dump didn't reveal this but did reveal a copyright notice (perhaps that's what he meant) that doesn't appear to be normally accessed. The following program will give an ASCII dump of the ROM (it makes interesting reading).

```
10  MODE 4
20  FOR M=&8000 TO &FFFF
30  P=?M: IF P<32 THEN P=P+64
40  PRINT CHR$(P)
50  NEXT M
```

Note: & implies a hexidecimal number. ? means "the byte at address" so it replaces P=PEEK(M) and POKE M,P (?M=P).

Literature

A number of good books have already been published about the BBC and software is also building up both here and in lesser cricketing nations (Britain and Australia). A New Zealand BBC club is already in full swing with a

24-page newsletter that rivals anything I've seen from any club. Both presentation and content are very good. Those interested should write to P.O. Box 1581, Wellington. A Christchurch branch has also been formed and those in the Canterbury region should write to Marty Richards at P.O. Box 1981, Christchurch. Free advice to people still looking for the right micro is available from this and most other micro clubs (see back of this magazine) so prospective users should take advantage of this.

From page 34

```
1690 T8=T1%3600+T2%60+T3+P%60
1700 IFT8>24%3600THEN10
1710 T1=INT(T8/3600)
1720 T2=INT((T8-T1%3600)/60)
1730 T3=T8-T1%3600-T2%60
1740 LO=LO+T9
1750 IFLO<360THEN1770
1760 LO=LO-360
1770 PRINT:PRINT'NEXT ORBIT ";:INP
UT'(Y/N)';A$:PRINT
1772 IFA$='Y'THEN1280
1773 IFA$='N'THEN10
1774 GOTO1770
1850 IFSGN(SO)=-1THEN1854
1852 X2=COS(6.28319%I/P)/COS(SO%P9
):GOSUB2370:L4=X7:GOTO1858
1854 X2=COS(6.28319%(I-(P/2))/P)/C
OS(SO%P9):GOSUB2370
1856 L4=X7:L4=L4+180
1858 S1=LO+L4+(I/4):IFS1<360GOTO18
70
1860 S1=S1-360
1870 RETURN
1920 X2=SIN(KO%P9)%SIN(SO%P9)
1930 X2=X2+COS(KO%P9)%COS(SO%P9)%C
OS(L5%P9)
1940 GOSUB2370
1950 D=X7
1960 IFD<0THEN1980
1970 D=0
1980 RETURN
2020 X2=SIN(SO%P9)-SIN(KO%P9)%COS(
D%P9)
2030 X2=X2/(COS(KO%P9)%SIN(D%P9))
2040 GOSUB2370
2050 C=X7:IFL5>=0THEN2070
2060 C=360-X7
2070 RETURN
2110 E=(A0+6367)%SIN(D%P9)
2120 E=E/((A0+6367)%COS(D%P9)-6367)

2130 E=ATN(E)
2140 E=90-360%E/6.28319:RETURN
2180 R=((A0+6367)%COS(D%P9)-6367)/
COS((90-E)%P9)
2190 RETURN
2220 IFX1>=1THENX8=90:GOTO2330
2230 IFX1<=-1.0THENX8=-90:GOTO2330
2250 X8=(ATN(X1/(1-(X1%X1))↑.5))/P
9
2330 RETURN
2370 IFX2>=1.0THENX7=0.0:GOTO2500
2380 IFX2<=-1.0THENX7=180.0:GOTO025
00
2400 X7=(ATN((1-(X2%X2))↑.5)/X2))
/P9
2450 IFSGN(X7)=-1THENX7=180+X7
2500 RETURN
3000 REM .. ORBITAL DATA FOR SATS.
3002 REM INCLINATION ANGLE = HO.
ALTITUDE = AO
3004 REM EQX TIME = H, M, S.   AT
= C, ORBIT NUMBER = N
3006 REM  DATE = D,  MONTH = M$
3008 REM PERIOD = P,   EQUATORIAL
INCREMENT = T9
3010 REM  .. AO7 ..
3012 HO=101.45 :AO=1449.6
3014 H=0:M=40:S=08:C=101.55:N=3623
6
3016 D=-14:M$='NOVEMBER 1982'
3018 P=114.939238:T9=28.7368   :GO
TO70
3020 REM  .. AO8 ..
3022 HO=98.7823:AO=920
3024 H=1:M=26:S=04:C=97.22:N=23628
3026 D=-7:M$='NOVEMBER 1982'
3028 P=103.171795:T9=25.7952821:GO
TO70
3030 REM  .. U09 ..
3032 HO=97.5018:AO=513
3034 H=0:M=44:S=04:C=144.72:N=5791
3036 D=-7:M$='NOVEMBER 1982'
3038 P=94.933805 :T9=23.7330189:GO
TO70
3040 REM  .. RS3 ..
3042 HO=82.9606:AO=1633
3044 H=0:M=37:S=0 :C=165.0 :N=0
 46 D=1 :M$='AUGUST 1982'
3048 P=118.5187  :T9=29.7564   :GO
TO70
3050 REM  .. RS4 ..
3052 HO=82.9566:AO=1666
3054 H=1:M=1 :S=0 :C=169   :N=0
3056 D=1 :M$='AUGUST 1982'
3058 P=119.39473 :T9=29.97652  :GO
TO70
3060 REM  .. RS5 ..
3062 HO=82.959 :AO=1672
3064 H=0:M=50:S=27:C=294.25:N=3741
3066 D=-7:M$='NOVEMBER 1982'
3068 P=119.554832:T9=30.0156805:GO
TO70
3070 REM  .. RS6 ..
3072 HO=82.9592:AO=1642
3074 H=0:M=02:S=25:C=285.00:N=3767
3076 D=-7:M$='NOVEMBER 1982'
3078 P=118.718039:T9=29.8061765:GO
TO70
3080 REM  .. RS7 ..
3082 HO=82.9568:AO=1662
3084 H=0:M=19:S=16:C=287.66:N=3752
3086 D=-7:M$='NOVENDER 1982'
3088 P=119.196548:T9=29.9260355:GO
TO70
3090 REM  .. RS8 ..
3092 HO=82.9568:AO=1675
3094 H=1:M=57:S=27:C=310.23:N=3735
3096 D=-7:M$='NOVEMBER 1982'
3098 P=119.764385:T9=30.0681548:GO
TO70
READY.
RUNS IN 4.5 K.
```

Toruses and gold

by Glenn Hocking

Torus is a one-person adventure game written for the Sharp PC1211. This program takes up all of the memory of the computer.

The setting is night in an unlit house. The house has 20 rooms; you are in one of them. Each room has two doors leading to other rooms. One of the rooms contains the door to get outside, another contains the gold.

The object is to steal the gold then get outside safely.

Two monsters, called Toruses, chase you and if you get trapped you will be eaten.

This game contains a best-score table. It is necessary to reset this table each time the variable memory is cleared.

To set up the best score table let S=100 and then run the program from line 700.

Program notes

Line 5 Resets variables.
Lines 10-67 Game instructions.
Lines 70-107 Sets up room contents.
Lines 120-125 Your moves.
Lines 130-240 Room checking and Torus movements.
Lines 500-520 You have found your way out routine.
Lines 600-620 You have been eaten routine.
Lines 630-730 Best score table.
Lines 900-910 Torus in your room routine.
Lines 950-960 You have found the gold routine.
Lines 970-974 Sets up room with way out.
Lines 996-999 Random number routine.

```
 5:G=-100:W=-10
   :S=0:U=0
10:PRINT "TO PL
   AY, YOU HAVE
   TO FIND
20:PRINT "THE G
   OLD BY GOING
    FROM
30:PRINT "ROOM
   TO ROOM. BUT
   BE CARE
40:PRINT "FUL, T
   HERE ARE 2 T
   ORUSES
50:PRINT "CHASI
   NG YOU! WHEN
   YOU, VE
60:PRINT "THE G
   OLD YOU MUST
    FIND A
65:PRINT "ROOM
   WHICH LEADS
   OUTSIDE
66:PRINT "THE T
   ORUSES CAN T
   RAP YOU
67:PRINT "AND I
   F THEY DO, YO
   U DIE!
70:GOSUB 996
80:Z=G
90:GOSUB 996
100:IF Z=GGOTO 9
   0
101:X=G
102:GOSUB 996
103:K=G
104:IF X=KGOTO 1
   03
106:GOSUB 996
107:J=G
109:BEEP 2
110:N=X-1:IF N<1
   LET N=20
111:V=X+3:IF V>2
   0LET V=1+(V-
   20)
115:X=ABS X
120:PRINT "YOU A
   RE IN ROOM "
   ;X:PRINT "TH
   ERE ARE TWO
   DOORS":PRINT
   "PICK A DOOR
    "; V; " "; N
125:INPUT "YOUR
   CHOICE IS ";
   M:S=S+1
130:IF M=VGOTO 1
   50
140:IF M<>NGOTO
   120
150:X=M:IF X=Z
   GOTO 950
155:U=U+1:IF U=7
   LET K=M
160:IF X=KGOTO 9
   00
170:IF X=JGOTO 9
   00
180:IF X<>KLET K=
   K-1:IF K<1
   LET K=ABS (K
   +-1)
190:IF X>KLET K=
   K+1:IF K>20
   LET K=18
200:IF X<JLET J=
   J-3:IF J<1
   LET J=ABS (J
   )+2
210:IF X>JLET J=
   J+3:IF J>20
   LET J=17
220:IF K=JLET K=
   K-1
230:IF X=GGOTO 5
   00
240:GOTO 110
500:BEEP 3:PRINT
   "YOU HAVE FO
   UND THE WAY
510:PRINT "OUT. Y
   OU DID NOT G
   ET"
520:PRINT "KILLE
   D. YOU MADE "
   ;S;"MOVES":
   GOTO 630
600:BEEP 2:PRINT
   "YOU HAVE BE
   EN TRAPPED"
610:PRINT "BY TH
   E TORUSES. YO
   U ARE
620:PRINT "DEAD!
   YOU MADE ";S
   ;"MOVES":
   GOTO 640
630:IF S<HGOTO 7
   00
640:PAUSE "BEST
   SCORE
650:PRINT I$;" "
   ;P$;" - ";H
660:END
700:PRINT "YOU H
   AVE THE BEST
   SCORE":H=S
710:INPUT "TYPE
   IN YOUR 1ST
   NAME ";I$:
   INPUT "TYPE
   YOUR LAST NA
   ME ";P$
730:GOTO 640
900:BEEP 1
901:PRINT "A TOR
   US IS IN THI
   S ROOM!":
   PRINT "YOU H
   AVE RUN TO "
   :X=X-1:IF X=
   0LET X=20
902:PRINT "ROOM
   ";X:U=0
905:IF J=XGOTO 6
   00
907:IF K=XGOTO 6
   00
910:GOTO 110
950:IF W=2GOTO 1
   60
952:BEEP 4
955:PRINT "YOU H
   AVE FOUND TH
   E GOLD!"
955:W=2
960:PRINT "YOU N
   OW HAVE TO G
   ET OUT":
   PRINT "OF HE
   RE
970:GOSUB 996
972:IF G=XGOTO 9
   70
974:G=G:GOTO 110
996:A=2
997:C=ABS (43914
   7+C+D):E=E8+
   1:F=23:C=C:C=F
   -INT (F/E):E
   :G=INT (10^A
   *C/E)-1:IF G
   <10^(A-1)
   GOTO 998
998:IF A<20GOTO
   997
999:RETURN
```

A winner

By PAUL J. KINLEY

This is my version of a 1K invaders game for ZX81s program adapted to run in 3K. It's a little slow but a lot of fun.

Shoot down as many invaders as you can. You must get 500 or close to, to stop invasion, don't waste time on those out of range but try to get 2 or 3 at once.

Use "5" and "8" to steer "0" to fire. Hit any key to run again. If you find 500 too hard change lines 137, 138, 139 to the number you want.

NIGHT INVADERS FOR 3K ZX81

```
 1   CLS
 2   FOR  A = 0  TO 17
 4   PRINT "■(20  GRAPHICS SPACES)■ "
 6   NEXT  A
 8   LET   S = 0
10   LET   A = 3
12   LET   V = A = A
20   PRINT AT   18, S;  " ■(20 GRAPHICS  H)■ "
40   FOR  C = V   TO  17  STEP  .05
50   PRINT AT C,  RND * 15;  "■(0)■"
60   LET  A = A - ( INKEY$ = "5" ) + ( INKEY$ = "8" )
65   IF  A< V  THEN  LET  A = V
80   IF  INKEY$ = "0" THEN GOTO 130
90   PRINT AT  18, A - V;  "■(✓)■"
100  NEXT C
110  PRINT  " (inverse) INVADERS HAVE LANDED "
115  PAUSE  200
120  GOTO  170
130  FOR B = 17  TO  C - 3  STEP - V
133  PRINT AT  B, A;
135  IF PEEK  ( PEEK 16398 + PEEK 16399 * 256 ) = CODE " (0) " THEN
     LET S = S + B
137  IF  S > 500  THEN PRINT "ATTACK  DEFEATED"
138  IF  S > 500  THEN PAUSE 200
139  IF  S > 500  THEN GOTO 170
140  PRINT AT  B, A;  " (*) "
145  PRINT AT  B, A;  " ■ "
150  NEXT  B
155  PRINT AT  5, 21;  " (inverse) SCORE= "; S
160  GOTO 100
170  CLS
180  PRINT " HIT ANY KEY TO GO AGAIN "
190  PAUSE  40000
200  RUN
```

Catchball

By JEREMY HOLLOBON

Catchball is a game for the 1K ZX81. You must catch as many of the falling balls as possible by moving the cup at the bottom underneath where the ball will fall. The cup is controlled by cursor keys 5 and 8. Ten balls will fall, one at a time, each going slightly faster than the last. After ten balls have been dropped, the number of balls caught and your score will be displayed.

The scoring is 30 points if the ball lands dead centre and ten points if it is caught on the edge of the cup. But beware! The balls also have occasional random side movement. When the game ends press any key for another game.

Once you have achieved a score of 260 or more, you may wish to make the game more difficult by substituting 1.6 for the 1.4 in line 260.

```
50  CLS
60  LET Z = NOT PI
70  LET E = NOT PI
80  LET X = SGN PI
90  LET B = VAL "14"
100 FOR F = 1 TO 10
110 LET D = NOT P1
120 LET C = INT (RND*25)+3
130 LET  C  =  C+  (INT(RND*8)=0)*
    (INT(RND*3)-1)
140 LET  B  =  B+(INKEY$="8"  AND
    B<29)-(INKEY$="5" and B> 0)
150 LET D = D+1
160 CLS
170 PRINT AT D,C;"O";AT 21, B; " ▙ "
180 OF D< 20 THEN GOTO CODE " ▙ "
250 IF C = B+1 THEN LET E = E+3
255 IF C = B OR C = B+2 THEN LET E =
    E+1
260 LET X = X+1.4
265 IF C = B OR C = B+1 OR C = B+2
    THEN LET Z = Z+1
270 NEXT F
280 PRINT AT 2,2;"YOU CAUGHT ";Z;"
    BALLS OUT OF 10"; at 6,10; "SCORE
    = "; E; O; AT 10,10;"ANY KEY FOR";
    TAB 11; "NEW GAME"
290 PAUSE 9999
300 RUN
```

SORD

M23 Printer Status Checks

Many programmers aim to make their programs as user-friendly as possible. One way of doing this is to test the status of the printer before trying to send data to it, thus avoiding the "lockup" syndrome which occurs if no printer is attached. The following routine illustrates how this may be done on the SORD M23.

```
1020 LET P=0
1030 PRINT CURSOR (20,0);
1040 PRINT "P for Parallel
     Printer, S for Serial Printer,
     «ESC» to Exit? : ";
1050 INPUT#0, " "; A$      *See
     Note below
1060 AI=INSTR (1, "PS" +
     CHR$ (27),A$)
     : IF A1=0 THEN GO TO 1050
     : ELSE
     : IF A1=3 THEN GO TO 1090
     : ELSE PRINT A$;
1070 IF A1=2 THEN
     : OPEN "SOUTA" AS FILE 1
     MODE 3
     : IF (INP (249) AND 100)<>
      100 THEN
     : CLOSE 1
     : GO TO 1030
     : ELSE GO TO 1100
1080 OPEN "POUT" AS FILE 1
     MODE 3
     : IF (INP (248) AND 1) <>1,
     THEN
     : GO TO 1030
     : ELSE GO TO 1100
1090 LET P=1
1100 RETURN
```

This routine (accessed by GOSUB 1000) will open either a parallel or serial printer provided it is connected and ready. If the user cannot make the printer ready or does not desire a printout then the «ESC» key may be pressed and the routine exits with the parameter P set to 1. Try this subroutine in the next report program you write — it can save a lot of wasted time and frustration!

Note: The INPUT statement on line 1050 contains a prompt string which is apparently of length zero (ie: a null string). SORD BASIC does not accept null strings so instead press CTRL-U (the control key and capital U pressed simultaneously) to generate a non-printing character for the prompt string.

APPLE

Hex to Decimal for Apple

By R. BENSON

This is a small program which displays the decimal and hex equivalents. It is written for the Apple II plus in Applesoft BASIC but is probably easily converted to run on most BASIC using computers.

```
10  REM THIS PROGRAM DISPLAYS
20  REM THE DECIMAL AND HEX
30  REM EQUIVALENTS
40  REM HEX TO DECIMAL
50  REM BY R.BENSON
60  REM
70  HOME
80  VTAB 8: PRINT "CTRL 'S' STOPS LISTING": PRINT "AND
      ANY OTHER LETTER STARTS IT AGAIN": PRINT "CTRL '
     C' BREAKS LISTING"
90  PRINT : PRINT "PRESS ANY KEY TO": PRINT "START LIS
     TING:";: GET A$
100  HOME
110  SPEED= 175: ONERR  GOTO 180
120  PRINT "HEX           DECIMAL"
130  POKE 34,2
140  PRINT
150 A$ = "0123456789ABCDEF": FOR B = 1 TO 16: FOR A =
     1 TO 16: FOR C = 1 TO 16: FOR I = 1 TO 16:W$ =  MID$
     (A$,B,1)
160 Z$ =  MID$ (A$,A,1):Y$ =  MID$ (A$,C,1):X$ =  MID$
     (A$,I,1): PRINT W$;Z$;Y$;X$,N
170 N = N + 1: NEXT : NEXT : NEXT : NEXT
180  POKE 34,0: SPEED= 255
190  END
```

From page 30

for thinking that, if computing is important to our national future, she or he already had enough natural disadvantages to cope with.

What we see is that the relative costs vary a great deal between different machines. The average national values taking the United States as 100 are Britain 112, Australia 179, New Zealand educational 170, and New Zealand retail 235.

Considerable variations also exist between the machines. Three are marginally cheaper in Britain than in the United States, either due to competitive factors or to the downward shift of the pound sterling over the period that we looked at prices. The Atari and VIC look to be heavily marked up outside of the United States for a different reason. Both machines were originally marketed for use with United States television on the American NTSC standard. The versions later introduced in countries using a PAL television standard (inlcuding New Zealand, Australia, and Britain) required extra circuitry to modify their video output. Consequently the cost of this was built into the standard version released in these countries. As Apple users will know the Apple also requires this circuitry if used with a domestic PAL colour television and this is at extra cost to the non-U.S. prices quoted here (it would add about 15 per cent to the Apple figure). By contrast, the ZX-81 and BBC machines were designed around PAL systems and the Sirius comes complete with its own high-resolution video monitor.

BBC users: tune in on this one

"Basic Programming on the BBC Microcomputer", Neil Cryer and Pat Cryer (Published by Prentice/Hall), $20.30 Reviewed by Martin Downey.

Seldom do books on programming appeal to a wide audience. They are usually aimed at some particular section within the computer field. However, "Basic Programming on the BBC Microcomputer" should appeal to just about all levels of competence because it includes so much information in such a readable format. Although the book assumes the reader has no computer experience it doesn't assume the reader is barely literate (a mistake many other computer books make). Also, it doesn't just stop at the fundamentals but tackles some of the more complex topics such as "File Handling".

Each chapter is broken down into a number of well defined sections most of which are followed by "Activities" which give questions and exercises. These are partly answered and discussed at the end of each chapter. Good use is made of sample BASIC programs encouraging a hands-on approach and maintaining reader interest. The authors assume that the reader has a BBC beside them to try things out as they go along. Although this is not essential it is certainly the best way to learn BASIC.

Contents

The book begins at the point of first turning on the computer. It teaches how to enter, run, and correct programs then goes on to give a full lesson in the BASIC language. BBC BASIC is based on standard Microsoft BASIC with numerous enhancements. The book covers all the standard commands as well as most of the "extras". The sections on use of the BBC's graphics, colour, animation and sound will be of particular interest to experienced programmers new to the BBC. However, such programmers shouldn't just skip straight to these "juicy bits" as the earlier chapters include a number of useful ideas.

Most of the information can be found within the ample pages of the USER's MANUAL but this tends to be too detailed for a neophyte and can even overwhelm a seasoned "hacker" at first glance. In particular, two BBC BASIC enhancements that I did not initially notice in the USER'S MANUAL were brought to my attention by this book. These were: GOTO X (X is a variable) and ON Y GOTO . . . ELSE. The book does not cover the use of ASSEMBLER routines within BASIC but this is consistent with the title.

Criticisms

The book is a normal adhesive bound paperback. The plasticised cover is a good idea for a book that will be used as much as this one but a spiral binding is virtually a must for this type of book so that it can be opened out flat and read while using the computer. Programs on pages 51 and 73 have "bugs." The reader will no doubt pick these up and learn from them but I doubt if they were intentional and such mistakes can be disconcerting.

Conclusion

A good tutorial in BASIC and an easy introduction into most of the powerful enhancements on the BBC. A must for the beginner with a BBC and a useful guide to the more experienced programmer. If you are using another type of computer this book may still be of some value but in general it is aimed specifically at BBC owners and prospective owners.

The facts from Dr Zaks

"From Chips to Systems: An Introduction to Microprocessors," by Rodnay Zaks. Published by Sybex. 552 pages (soft cover). $31.95. Reviewed by Warren Marett.

For those of us who are not electronically inclined, it is often with an emotion mixed between despair and amazement that one looks at the boards and chips that make up a microcomputer.

This book, by THE Rodnay Zaks, is an excellent start to helping unravel the mysteries, as well as providing entertaining background and historical reading.

"From Chips to Systems" principally concentrates on a "logical" description of microprocessors and microcomputers rather than what may be called a "physical" description. There is little electronic theory or discussion on topics such as printed circuit boards.

Rather the book describes how a microprocessor and its support chips function at a logical level; for example, how an instruction is processed through the control unit, arithmetic and logical unit, registers, buses and memory (without mention of electrical signals or fundamental electronic components).

Included in a large chapter on system components is good information about the buses that connect parts of the microprocessor and connect the microprocessor to its support chips.

On completing this book, the reader will not be able to design his own microcomputer. But he or she will be much more knowledgeable about the workings of microprocessors, bit-slice processor, memory chips, buses and input/output chips, and will be ready to dive into the practical electronic books.

A large book, it nevertheless does not waste any words (which is the way many of us prefer our computer texts).

Quite properly, the introduction states that it is not necessary to have prior experience with electronics. It is the author's contention that it is possible to learn about microprocessors in a short time, and the book appears to confirm his view.

It is not clear that the book is suitable for newcomers to computers. Its fast pace indicates that it is probably better to read it after mucking about with a personal computer or after attending computer courses at a tertiary level.

The reader is recommended by Zaks to read it cover to cover, but the book should also make a valuable reference document.

"From Chips to Systems" was originally published under another name in 1977 and this is an updated version, completely revised and re-illustrated. Sixteen bit microprocessors are reviewed in part of one chapter, but the main emphasis is on 8-bit processors such as the 8080 and 6800.

Microprocessor programming principles are covered over two or three sections of the book, although the reader would be well advised to be already familiar with programming, preferably at the assembly-language level.

Other chapters cover microprocessor applications and interfacing techniques. There are brief discussions on comparative microprocessor evaluation, system development, and the future of microprocessors.

The book is, if anything, over-illustrated, and is quite well presented. There is a large, but not exhaustive, index.

In summary, this text is good value and will help round out a "Bits & Bytes" reader's library.

For PET enthusiasts

"The Alien, Numbereater and other Programs for Personal Computers." By John Race, MacMillan Press, 1981. 86 pages. Reviewed by Steven Darnold. $12.95.

One of the best reasons for joining a computer club is the opportunity to compare programming experiences with other members.

BOOKS

We all learn from our mistakes, and it's good to be able to share our moments of triumph and disaster. John Race's book is a little bit like a computer club meeting: he presents his programs, warts and all, and discusses them with you.

There are only 14 programs in the book, but each is accompanied by a detailed discussion of what the program does and how it was written. John Race obviously enjoys programming, and his enthusiasm and sense of humour are to the fore. That is not to say, however, that the programs are trivial. Most of the programs incorporate some interesting programming technique, and several are quite mathematical.

In spite of the cute title, this is not a book for beginners. Several of the programs use advanced techniques and most require a thorough knowledge of BASIC. Rather, this is a book for the enthusiast. It's ideal for the schoolboy who knows more about computers than his teacher, or for the man who bought a computer 12 months ago and hasn't been to the pub since.

The programs are all written for the Commodore PET. The introduction claims that other computers will be able to use the programs; however, I have examined the programs closely and only six will readily adapt to other computers. Even Commodore VIC-20 users will have difficulty. To get full value from this book, you need a PET or Commodore 64.

COMMERCIAL CLASSIFIEDS

Commercial Classifieds are available at 50c per word (minimum of 15 words). BITS & BYTES reserves the right to determine if any advertisement is a commercial classified. All commercial classifieds must be paid for before publication unless by prior arrangement.

One for browsers

"Discovering Computers," by Mark Frank. Published by Longman. 96 pages (hard cover). $19.95. Reviewed by Warren Marett.

In your reviewer's experience, the hardest teaching assignment known is to attempt to teach computer concepts to the uninitiated.

Morally, then, it would be unfair to criticise "Discovering Computers," a book which "explains what computers are, how they work, and what they can and cannot do."

If one had no scruples, one might be critical of the book's organisation, or the occasions where the book seems to depart from reality — whether it was done to keep the explanation simple or whether the author had not given enough thought to the exposition.

But the author has obviously tried hard to cover many facets of the computer and its application.

The book's strong points are its pleasing layout and many good diagrams and photographs.

It is a browsing book, one which folk can skim through to learn some of the concepts and enjoy the illustrations.

CLASSIFIEDS

J. Walton of Oamaru please contact **BITS & BYTES** with your full address.

FOR SALE. I have upgraded from my OSI Challenger C4P, which is now for sale. Outstanding graphics capability, supported by extensive literature including workshop manual, and a number of programmes on tape. Cassette interface with 8K of RAM. Price $900. Can be seen in Hamilton. Enquiries to S.G. Willson, 405 Mako Road, Whangamata. Phone 58-266 Whangamata.

WILDCARD FOR APPLE II. Cost $249. Offers please. 2 Blucher Ave. Wellington. Ph: 898-346.

VIC-20's for sale. For the best all-round deal ring Brian Bullen. Ph 298-8676 Papakura.

FOR SALE One ZX81, 8K RAM pack with special features $80. Contact Brendon Humphries, 718 Abberdeen Road, Gisborne. Ph: 4663.

FOR SALE: Hewlett Packard HP1L interface with tape drive, video interface, monitor & two tapes. To suit HP41 handheld. Comprehensive manuals, video software, power supply & cables also supplied. $1500.00. Telephone C.M. Lowcay WN662-866 after 5 p.m.

FOR SALE Sinclair ZX81. Includes 16K RAM expansion. Power Supply. Leads, manual, magazines, program. Ideal first computer. $300 all in. Phone Mike. Auckland 865-009 evenings.

VIC Owners: Join N.Z.'s leading VIC user group for access at low, low cost to a library of over 200 VIC programs. Write for details to: Nelson VIC Users Group, C/- P.O. Box 860, NELSON.

FOR SALE Complete system with software and firmware. An upgraded OSI Challenge I P. with dual disc drive and printer. Expanded memory and other features. Rod McPherson Ph 895-431 or 639 Worcester St, Christchurch.

SHARP PC User wishes to contact others. Especially interested in Business software. Write Nick Parker PO Box 11725, Manners St P.O. Wellington.

FOR SALE 21L02/4102N 120nS 1K x 1 static RAM. 5 for $1.00. H.N. Wiggins P.O. Box 1718, Palmerston North.

FOR SALE: Compucolor 16K with deluxe keyboard, 8 colour 18 MHz monitor, disk, software and manuals. Offers Ph. 325-503 Wellington.

VIC

From page 35

```
110 DATA 169, 24, 133, 2
120 DATA 76, 77, 3, 169
130 DATA 24, 133, 1, 169
140 DATA 28, 133, 2, 169
150 DATA 128, 133, 254, 169, 0
160 DATA 133, 253, 160, 0
170 DATA 177, 1, 145, 253
180 DATA 230, 253, 208, 2
190 DATA 230, 254, 165, 253
200 DATA 201, 232, 208, 7
210 DATA 165, 254, 201, 131
220 DATA 208, 1, 96, 230
240 DATA 1, 208, 2, 230
250 DATA 2, 76, 87, 3
260 DATA 169, 48, 133, 1
270 DATA 169, 24, 133, 2
280 DATA 76, 138, 3, 169
290 DATA 24, 133
300 DATA 1, 169, 28, 133
310 DATA 2, 169, 0, 133
320 DATA 253, 133, 254, 168
330 DATA 169, 32, 145, 1
340 DATA 230, 1, 208, 2
350 DATA 230, 2, 230, 253
360 DATA 208, 2, 230, 254
370 DATA 165, 253, 201
380 DATA 232, 208, 7, 165
390 DATA 254, 201, 3, 208
400 DATA 1, 96, 76, 145, 3
READY.
```

FARMING

From page 26

Irony — One of the ironies of computer use for financial analysis and control is that those who most need one can least afford one. If you are under considerable financial pressure, a computerised cash book enables you to know your financial situation at any time with a minimum of fuss. This allows greater control over expenditure and income, allowing you to best match expenditure with income, resulting in a lower overdraft and hence lower interest payments.

If you use a computer for herd or flock recording, better use can be made of the information collected because the computer can calculate rankings and indices for stock selection much more easily than by hand. Comparisons with other years can be made easily, without having to sort through card files. This means these comparisons are much more likely to be carried out.

Savings in time can apply to a variety of activities and it is impossible to categorise possible savings.

To place dollar values on the benefits through better management information and time savings, it is essential to talk to someone using a computer in the same fashion as you intend to. Or ask a consultant (computer or farm consultant) who has a good knowledge of farming and the use of computers on farms.

This is really the only way because of the vast differences in the way farmers collect and use the information with which they make decisions.

Next month, we will consider what to look for when buying farming software, and a few examples of what software is available.

COMPUTASHOP.

NZ's Widest Selection of Personal Computers monitors, printers, disk drives

*ZX-80 *Vic 20 *Hewlett Packard
*Atari *System 80 *BBC MICRO
*TRS80 Color Computer

★ Osborne ★ Epson HX-20

We look forward to your visit. Write for Mail Orders.
Credit Cards Accepted.

EINSTEIN SCIENTIFIC LIMITED
177 Willis Street, Wellington
PO Box 27138 Ph. 851-055 Tx NZ3380

MicroAge MicroPro DISTRIBUTOR FOR N.Z.

* WordStar	$595	* SpellStar	$322	* MailMerge	$216
* DataStar	$440	* CalcStar	$380	* ReportStar	$410

IBM PC AND APPLE FORMATS AVAILABLE
MicroAge International (NZ) Ltd
P.O. Box 13-054 353-357 Hereford St, Christchurch.
Phone 891-109

SoftSide $6

The magazine for APPLE, ATARI, TRS80/SYSTEMS 80 Users
Available from March 1982 onwards @ $6/isuue post free in NZ.

TME **TARANAKI MICRO ELECTRONICS**

CENTRECOURT BUILDINGS, NEW PLYMOUTH, PHONE 84-067
N.B. School orders accepted

KAYPRO II Portable Computer
COLOMBIA MPC 16 Bit Computer
Sole South Island distributors

TURNERS Ltd

P.O. Box 1021 Christchurch
Phone 794-820

AVM ELECTRONIC

FOR THE LATEST IN MICROCOMPUTERS
COMMODORE 64 & VIC20
ATARI
SINCLAIR

Lay Buy
Easy Terms
Trade-ins

EARN 14½% INTEREST WHILE YOU SAVE

149 HEREFORD STREET, CHRISTCHURCH PHONE 797-279
(Opp. Reserve Bank)

VIC 20

JAMES ELECTRONICS LTD
POLLEN ST
BOX 527
THAMES
Ph. 86-893

$795

Games tape 1 (needs 8k exp)
Snake-Maths Game-Ball in Bucket
Games tape 2 (no exp reqd)
Formula 1 - Concentration-Line Game
$15 each p&p $1

Also available for VIC20 Payroll and Cashbook programs. Write for details.

COMMODORE 64
VIC – 20

Deal with the specialist

Large range of software & hardware available. (Including some exclusive to us)

Write for price list and product information to:

Peter Archer

PERSONAL COMPUTER SYSTEMS
P.O. Box 860, NELSON.
Telephone NN 79362.

Please support BITS & BYTES advertisers

CLUB CONTACTS

WHANGAREI COMPUTER GROUP: Tom Allan, 3 Maunu Rd, Whangarei. Phone 83-063 (w). Meets every second Wednesday of the month at Northland Community College.

NZ MICROCOMPUTER CLUB INC, P.O. Box 6210, Auckland. The monthly Meeting is held on the first Wednesday of each month at the VHF Clubrooms, Hazel Ave., Mt Roskill, from 7.30pm. Visitors are also welcome to the computer workshop in the clubrooms, 10am–5pm, on the Saturday following the above meeting.
The following user groups are part of the club. All meetings shown start 7.30pm at the VHF Clubroom.
Other active user groups within the club are:
APPLE, CP/M, DREAM 6800, SMALL BUSINESS, KIM, LNW, SORCERER, 1802 and 2650. They can all be contacted at club meetings or via NZ microcomputer Club, P.O. Box 6210, Auckland.
APPLE USERS' GROUP: Bruce Given, 12 Irirangi Rd., One Tree Hill. Phone 667-720 (h).
ATARI MICROCOMPUTER USERS GROUP: Brian or Dean Yakas. Phone 8363 060 (h). Meetings: Second Tuesday.
BBC USERS' GROUP: Dave Fielder. Phone 770-630 ext 518 (w).
BIG BOARD USER GROUP: Steve Van Veen, Flat 5, 111 Melrose Rd, Mt Roskill, Auckland 4. Phone (09) 659-991 (h).
BUSINESS USERS' GROUP: John Hawthorn, 11 Seaview Rd, Remuera. Phone 542-714 (h), 876-189 (w). Meetings monthly.
COMMODORE USERS' GROUP: Doug Miller, 18 Weldene Ave., Glenfield. Phone 444-9617 (h), 497-081 (w). Meetings: Third Wednesday.
CP/M USERS' GROUP: Kerry Koppert, 2/870 Dominion Rd., Balmoral. Phone 69-5355 (h). Meetings: Micro workshop.
DREAM 6800 USERS: Peter Whelan, 22 Kelston St, New Lynn, Auckland. Phone (09) 875110 (h).
KIM USERS: John Hirst, 1A Northboro Rd, Takapuna. Phone (09) 497-852 (h).
LNW USERS: Ray James. Phone (09) 30-839 (w), 585-587 (h).
SINCLAIR USERS' GROUP: Doug Farmer. Phone 567-589 (h). Meetings: Fourth Wednesday.
SORCERER USERS' GROUP (NZ): Selwyn Arrow. Phone 491-012 (h). Meetings: Micro workshop.
1802 USERS' GROUP: Brian Conquer. Phone 655-984 (h).
The above contacts can usually be found at NZ Microcomputer Club Meetings, or via P.O. Box 6210, Auckland.

Other Auckland-based groups:
ACES (Auckland Computer Education Society): Ray Clarke, 1 Dundas Pl., Henderson. Phone 836-9737 (h).
CMUG (Combined Microcomputer Users' Group): This is an association of Microcomputer Clubs, Groups, etc, formed to co-ordinate activities and to give a combined voice on topics concerning all micro users. Representation from all Clubs and Groups is welcomed to: CMUG C/- P.O. Box 6210, Auckland.
EPSON HX20 USERS' GROUP. Contact: C.W. Nighy, 14 Domett Avenue, Epsom, Auckland. (Ansaphone, 774-268).
HP41C USERS' GROUP (Auckland): C/- Calculator Centre, P.O. Box 6044, Auckland: Grant Buchanan, 790-328 (w). Meets third Wednesday, 7pm, at Centre Computers, Great South Rd., Epsom.
NZ TRS-80 MICROCOMPUTER CLUB: Olaf Skarsholt, 203A Godley Rd., Titirangi. Phone 817-8698 (h). Meets first Tuesday, VHF Clubrooms, Hazel Ave., Mt Roskill, Auckland.
OSI USERS' GROUP (Ak): Vince Martin-Smith, 44 Murdoch Rd., Grey Lynn, Auckland. Meets third Tuesday, VHF Clubrooms, Hazel Ave., Mt Roskill.
SYMPOOL (NZ SYM USER GROUP): J. Robertson, P.O. Box 580, Manurewa. Phone 266-2188 (h).
A.Z..T.E.C.: Brian Mayo Church Street, Katikati. Phone 490-326. Members use all micros and the club has just bought a Wizzard.
TAURANGA SINCLAIR COMPUTER CLUB: C. Ward, Secretary, P.O. Box 6037, Brookfield, Tauranga. Phone 82-962 or 89-234.
ATARI 400/800 USER CLUB: Dave Brown, P.O. Box 6053, Hamilton. Phone (071) 54-692 (h).
GISBORNE MICROPROCESSOR USERS' GROUP: Stuart Mullett-Merrick, P.O. Box 486, Gisborne. Phone 88-828.
ELECTRIC APPLE USERS' GROUP: Noel Bridgeman, P.O. Box 3105, Fitzroy, New Plymouth. Phone 80-216
TARANAKI MICRO COMPUTER SOCIETY: P.O. Box 7003, Bell Block, New Plymouth: Francis Slater. Phone 84-514.
HAWKE'S BAY MICROCOMPUTER USERS' GROUP: Bob Brady, Pirimai Pharmacy, Pirimai Plaza, Napier. Phone 439-016.
MOTOROLA USER GROUP: Harry Wiggins, (ZL2BFR), P.O. Box 718, Palmerston North. Phone (063) 82-527 (h).
MICRO AND PEOPLE IN SOCIETY (MAPS): Levin, meets on second and fourth Thursday of each month. D. Cols, 28 Edinburgh Street, Levin. Phone 83-904, or W. Withell, P.O. Box 405, Levin.
ATARI USERS' GROUP, Wellington: Eddie Nickless. Phone 731-024 (w). P.O. Box 16011. Meetings: first Wednesday of month.

CENTRAL DISTRICTS COMPUTERS IN EDUCATION SOCIETY: Rory Butler, 4 John Street, Levin. (069) 84-466 or Margaret Morgan, 18 Standen Street, Karori, Wellington. (04) 767-167.
UPPER HUTT COMPUTER CLUB: Shane Doyle, 18 Holdworth Avenue, Upper Hutt. Phone 278-545. An all-machine club.
BBC USER GROUP: Users of other machines welcome too. Write P.O. Box 1581, Wellington, or Phone 861-213, Wellington.
OSBORNE USER GROUP: Dr Jim Baltaxe, C/- 7b Ghuznee Street, Wellington 1. Phone (04) 728-658.
NZ SUPER 80 USERS' GROUP: C/- Peanut Computers, 5 Dundee Pl., Chartwell, Wellington 4. Phone 791-172.
OHIO USERS' GROUP, Wellington. Secretary/Treasurer: R.N. Hislop, 658 Awatea Street, Porirua.
WELLINGTON MICROCOMPUTING SOCIETY INC.: P.O. Box 1531, Wellington, or Bill Parkin (h) 725-086. Meetings are held in Wang's Building, 203-209 Willis Street, on the 2nd Tuesday each month at 7.30pm.
NELSON MICROCOMPUTER CLUB: Dr Chris Feltham, Marsden Valley Rd, Nelson. Phone (054) 73-300 (h).
NELSON VIC USERS' GROUP: Peter Archer, P.O. Box 860, Nelson. Phone (054) 79-362 (h).
BLENHEIM COMPUTER CLUB: Club night second Wednesday of month. Ivan Meynell, Secretary, P.O. Box 668. Phone (h) 85-207 or (w) 87-834.
CHRISTCHURCH ATARI USERS GROUP: Contact Edwin Brandt. Phone 228-222 (h), 793-428 (w).
CHRISTCHURCH '80 USERS' GROUP: David Smith, P.O. Box 4118, Christchurch. Phone 63-111 (h).
CHRISTCHURCH PEGASUS USERS' GROUP: Don Smith, 53 Fasquhars Rd, Redwood, Christchurch. Phone (03) 526-994 (h), 64-544 (w), ZL3AFP.
CHRISTCHURCH APPLE USERS' GROUP: Paul Neiderer, C/- P.O. Box 1472, Christchurch, Phone 796-100 (w).
OSI USERS' GROUP (CH): Barry Long, 377 Barrington St., Spreydon, Christchurch. Phone 384-560 (h).

CHRISTCHURCH SINCLAIR USERS' GROUP: Mr J. Mitchell, Phone 385-141, P.O. Box 33-098.
CHRISTCHURCH COMMODORE USERS' GROUP: John Kramer, 885-533 and John Sparrow. Phone 896-099.
ASHBURTON COMPUTER SOCIETY: Mr J. Clark, 52 Bruce field Avenue.
SOUTH CANTERBURY COMPUTERS' GROUP: Caters for all machines for ZX81 to IBM34. Geoff McCaughan. Phone Timaru 84-200 or P.O. Box 73.
LEADING EDGE HOME COMPUTER CLUB: Elaine Orr, Leading Edge Computers, P.O. Box 2260, Dunedin. Phone 55-268 (w).
DUNEDIN VIC USERS' GROUP: Terry Shand, 24 Bremner Road, Fairfield. Phone (024) 881-432. Meetings last Thursday of month.
DUNEDIN SORD USERS' GROUP: Terry Shand. Phone (024) 771-295 (w), 881-432 (h).
NOTE: Clubs would appreciate a stamped, self-addressed envelope with any written inquiry to them.

NOTE: If your club or group is not listed, drop a line with the details to: Club Contacts, BITS & BYTES, Box 827, Christchurch. The deadline for additions and alterations is the second weekend of the month before the next issue.

Back copies

Back copies of previous issues are available at $1.50 each.

Major stories in our first six issues included:

September	What to look for in your first computer, start of series on graphics, Kellogg farm software.
October	start of series explaining BASIC computer language, feature on microcomputers for doctors and dentists, start of series on designing business software.
November	review of BBC computer and Microprofessor 1, start of series on selecting a micro for a small business, featue on microcomputers for accountants.
December/ January	review of Colour Computer, feature on farm computing, adventure computer games.
February	hand-held computer feature, review of Sirius 1 and Epson HX-20, start of farming and education columns.
March	Reviews of Microbee Hitachi Peach and Apple II.
APRIL	Review of IBM PC NEC PC 8000 and New Zealand made disk drives for System 80. New Sord column.

GLOSSARY

Algorithm: A list of instructions for carrying out some process step by step.

Applications program: A program written to carry out a specific job, for example an accounting or word processing program.

Array: A data structure common to most high-level languages. Characterised by each element in the array having a specific index.

BASIC: Beginners' All-purpose Symbolic Instruction Code. The most widely used, and easiest to learn, high level programming language (a language with English-like instructions) for microcomputers.

Binary: The system of counting in 1's and 0's used by all digital computers. The 1's and 0's are represented in the computer by electrical pulses, either on or off.

Bit: Binary digit. Each bit represents a character in a binary number, that is either a 1 or 0. The number 2 equals 10 in binary and is two bits.

Boot: To load the operating system into the computer from a disk or tape. Usually one of the first steps in preparing the computer for use.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program.

Byte: Eight bits. A letter or number is usually represented in a computer by a series of eight bits called a byte and the computer handles these as one unit or "word".

Character: Letters, numbers, symbols and punctuation marks each of which has a specific meaning in programming languages.

Chip: An integrated circuit etched on a tiny piece of silicon. A number of integrated circuits are used in computers.

Computer language: Any group of letters, numbers, symbols and punctuation marks that enable a user to instruct or communicate with a computer. See also Programming languages and Machine language.

Courseware: Name for computer programs used in teaching applications.

CP/M: A disk operating system available for microcomputers using a particular microprocessor (that is the 8080 and Z80 based microcomputers such as the TRS 80 and System 80). See also Disk Operating Systems.

Cursor: A mark on a video that indicates where the next character will be shown, or where a change can next be made.

Data: Any information used by the computer either I/O or internal information. All internal information is represented in binary.

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. A flexible or floppy disk is a single 8 inch or 5¼ inch disk of flexible plastic enclosed in an envelope. A hard disk is an assembly of several discs of hard plastic material, mounted one above another on the same spindle. The hard disk holds up to hundreds of millions of bytes – while floppy disks typically hold between 140,000 and three million bytes.

Disk drive: The mechanical device which rotates the disk and positions the read/write head so information can be retrieved or sent to the disk by the computer.

Diskette: Another name for a 5¼ inch floppy disk.

Disk operating system: A set of programs that operate and control one or more disk drives. See CP/M for one example. Other examples are TRSDOS (on TRS 80) and DOS 3.3 (for Apples).

DOS: See Disk Operating System.

Dump: Popular term for sending data from a computer to a mass storage device such as disks or tape.

Execute: A command that tells a computer to carry out a user's instructions or program.

File: A continuous collection of characters (or bytes) that the user considers a unit (for example on accounts receivable file), stored on a tape or disk for later use.

Firmware: Programs fixed in a computer's ROM (Read Only Memory); as compared to software, programs held outside the computer.

Hardware: The computer itself and peripheral machines for storing, reading in and printing out information.

High-level language: Any Englishlike language, such as BASIC, that provides easier use for untrained programmers. There are now many such languages and dialects of the same language (for example MicroBASIC, PolyBASIC etc).

Input: Any kind of information that one enters into a computer.

Input device: Any machine that enters information into a computer. Usually done through a typewriter like keyboard.

Interactive: Refers to the "conversation" or communication between a computer and the operator.

Interface: Any hardware/software system that links a microcomputer and any other device.

I/O "Input/output".

K: The number 1024. Commonly refers to 1024 bytes. Main exception is capacity of individual chips, where K means 1024 bits.

KILOBYTE (or K): Represents 1024 bytes. For example 5K is 5120 bytes (5 x 1024).

Machine language: The binary code language that a computer can directly "understand".

Mass storage: A place in which large amounts of information are stored, such as a cassette tape or floppy disk.

Megabyte (or Mb): Represents a million bytes.

Memory: The part of the microcomputer that stores information and instructions. Each piece of information or instruction has a unique location assigned to it within a memory. There is internal memory inside the microcomputer itself, and external memory stored on a peripheral device such as disks or tape.

Memory capacity: Amount of available storage space, in Kbytes

Menu: List of options within a program that allows the operater to choose which part to interact with (see Interactive). The options are displayed on a screen and the operator chooses one. Menus allow user to easily and quickly set into programs without knowing any technical methods.

Microcomputer: A small computer based on a microprocessor.

Microprocessor: The central processing unit or "intelligent" part of a microcomputer. It is contained on a single chip of silicon and controls all the functions and calculations.

Modem: Modulator-demodulator. An instrument that connects a mircrocomputer to a telephone and allows it to communicate with another computer over the telephone lines.

Network: An interconnected group of computers or terminals linked together for specific communications.

Output: The information a computer displays, prints or transmits after it has processed the input. See input and I/O.

Pascal: A high-level language that may eventually rival BASIC in popularity.

PEEK: A command that examines a specific memory location and gives the operator the value there.

Peripherals: All external input or output devices: printer, terminal, drives etc.

Personal computer: A small computer for one's own use, whether in the home, school or business.

Pixel: Picture element. The point on a screen in graphics.

POKE: A command that inserts a value into a specific memory location.

Printer: Device that prints out information onto paper.

Program: A set or collection of instructions written in a particular programming language that causes a computer to carry out or execute a given operation.

RAM: Random access memory. Any memory into which you "read" or call up data, or "write" or enter information and instructions.

REM statement: A remark statement in BASIC. It serves as a memo to programmers, and plays no part in the running program.

Resolution: A measure of the number of points (pixels) on a computer screen.

ROM: Read only memory. Any memory in which information or instructions have been permanently fixed.

Simulation: Creation of a mathematical model on computers that reflects a realistic system.

Software: Any programs used to operate a computer.

Storage: See Mass storage.

System: A collection of hardware and software where the whole is greater that the sum of the parts.

Tape: Cassette tape used for the storage of information and instructions (not music).

Teletext: An information service which transmits written information in the spaces in the television signal. A teletext decoder is needed to display this information. It is being implemented in N.Z.

Template: A predefined pattern which can be placed over a blank form. The resultant combination can then be used for a given task. For example, Visicalc is regarded as the blank form, a template can be written with the appropriate headings and calculations resulting in a combination which would work like an application program.

VDU: Visual display unit. A device that shows computer output on a television screen.

Word: A group of bits that are processed together by the computer. Most microcomputers use eight or 16 bit words.

ComputeX'83

Bringing Computers to life

RADIO 2ZA invites you to a unique exhibition of Computers in all shapes and sizes. From video games to business systems these computers will expand your horizons and prepare you for the future. It will provide an exciting adventure into the achievements of modern technology. The age of computers has no age barriers . . . suitable for the whole family in all walks of life.

RADIO MANAWATU 2ZA

May 27th to 29th
Convention Centre — Main Street — Palmerston North
Friday 10.00 a.m. - 8.00 p.m. Saturday 10.00 a.m. - 6.00 p.m.
Sunday 10.00 a.m. - 4.00 p.m.
Admission: Adults $1.00, Children .50 cents

COM 601

IT'S HERE!

Announcing the IBM of Personal Computers.

For 40 years IBM has built up a wealth of experience and expertise in computers. In helping business deal with the unprecedented growth of the pressures, problems and paperwork of this information age.

Now that knowledge is built into a special solution for the individual businessman — a tool for modern times: the IBM Personal Computer.

Getting things accomplished.

The most-often-asked questions about this tool are: how easy is it to use and just what do I use it for?

The first question is simple to answer. As with any new tool, you'll want to get comfortable with the IBM Personal Computer before putting it to serious use. You'll have some step-by-step reading, but our instructional literature involves you from the start. And the Computer is on your side too — interacting with you as you learn. There's no reason why you can't be executing programs and feeling good with the results within your first week. After a month, it should be clear that you've made a good investment, and you'll probably be telling your friends why they should get one.

The second question has no single answer. The IBM Personal Computer is a computer designed for a person. It's a tool to help accomplish just about anything a person needs to do with information. It can help a businessperson solve complex problems just as surely as it can help a small child improve his or her arithmetic.

What's in store?

To keep up with modern times, visit your authorised IBM Personal Computer dealer today — or call at the IBM Product Centre in Auckland, Wellington or Christchurch.

Ask what programs are available now. Get a demonstration.

Be sure you check out the specifications and features that make this the IBM of Personal Computers — features that set it apart.

You'll find that the quality, power — and reliability — are what you'd expect from IBM. The price isn't.

Remember call at the IBM Product Centre in Auckland, Wellington or Christchurch. Or one of your authorised IBM Personal Computer Dealers.

IBM

HELPING PEOPLE FIND THE ANSWERS

The IBM Personal Computer.

A tool for modern times.

2.3

Whangarei: M.M. Baigent & Co. Ltd. Phone 84-979. **Auckland:** Byte Shop Phone 32-860. Computerland (NZ) Ltd. Phone 798-005 or 798-078. Financial Systems Limited Phone 789-068 or 789-069. International Office Equipment Phone 775-372. **Hamilton:** Thomson & Ward (1971) Ltd. Phone 82-679. **Rotorua:** Thomson & Ward (1971) Ltd. Phone 479-172. **Tauranga:** Bay of Plenty Office Supplies Phone 81-009. **Hastings:** Midland Data Processing Phone 84-528. **Palmerston North:** Barlow Electronics Ltd. Phone 70-845 or 70-849. **Wellington:** Compusales Phone 844-146. Project Computers Phone 731-152. Wordcom Bureau Phone 729-028. **Nelson:** Geo. Berryman Ltd. Phone 81-489. **Christchurch:** Geo Berryman Ltd. Phone 793-920. Small Business Software Ltd. Phone 64-617 or 64-717. **Dunedin:** Whitcoulls Ltd. Phone 774-120. **Invercargill:** Office Equipment Southland Phone 84-448. • IBM Product Centres, **Auckland:** Phone 778-910. **Wellington:** Phone 729-499. **Christchurch:** Phone 792-040. **Suva, Fiji:** Kelton Marketing Ltd. Phone 385-533.